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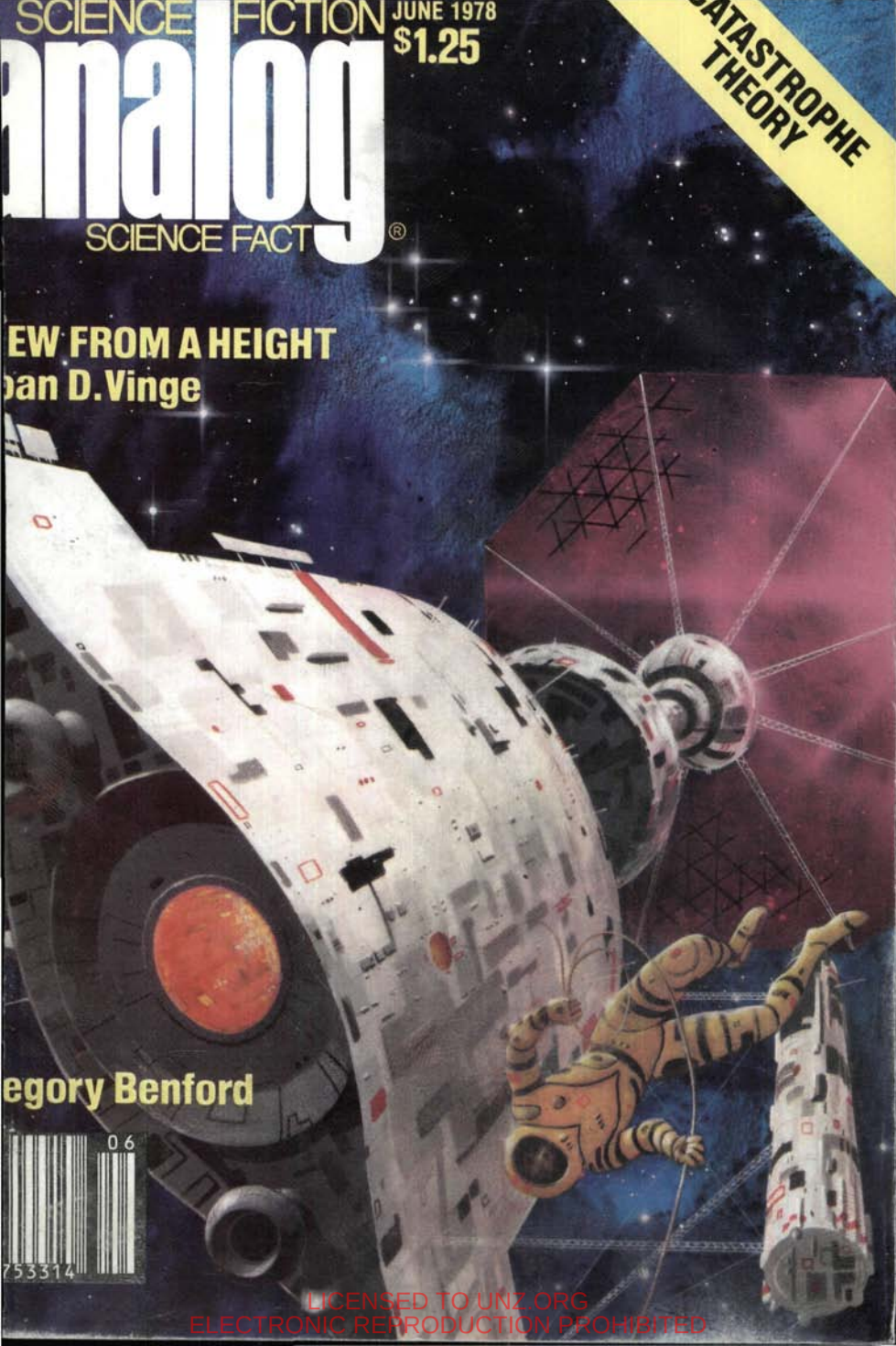

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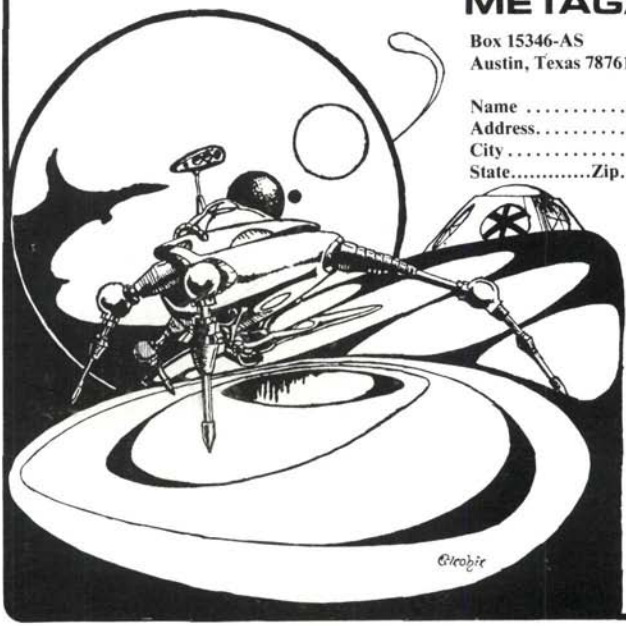

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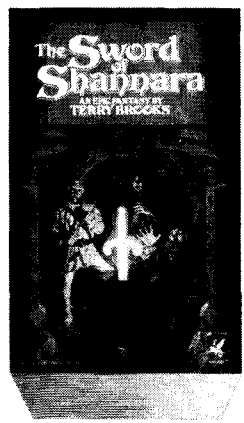

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EDITORIAL

"trust the force"

We seldom run reviews or articles about science fiction films, because most SF "flicks" have very little that's new or even interesting to say to Analog's readers. But there is now such a science fiction boom coming out of Hollywood that the phenomenon cannot be ignored.

And it is literally a *boom*. The two films that have caused the most excitement—"Star Wars" and "Close Encounters of the Third Kind"—depend very heavily on their sound tracks for their powerful effect on audiences. It would be an interesting experiment, in fact, to have a fresh audience view these two films for the first time with the sound tracks turned off, to see what their reaction might be. Neither film really needs its dialogue to enlighten the viewers. In "Close Encounters" the dialogue is fragmentary and nonessential. In "Star Wars" it is inane, although occasionally informative.

The boom is an economic phenomenon, as well. Twentieth-Century Fox's stock zoomed on Wall Street when "Star Wars" unexpectedly started breaking all previous records for box-office receipts. Columbia's stock actually dropped several points when the sneak preview of "Close Encounters" was panned. But once the film premiered in New York and long lines of avid ticket buyers beseiged the theater, Columbia became a growth stock, too.

Science fiction films have had a curious history. They began with the tongue-in-cheek silent movies of George Meliés, a stage magician turned moviemaker who invented a hatful of special effects to go with his pioneering work, around the turn of the century. Then a few of the giants of the industry turned their hands to films of science fictional content, including Fritz Lang, whose "Metropolis" is still a mainstay of any SF film curriculum.

But while Meliés gleefully melded Jules Verne ideas with Folies-Bergères chorus girls and trick camera work that was usually intended to be humorous, Lang leaned more toward Gothic dourness and heavily moralistic themes. "Metropolis" has splendid special effects, but to a modern audience it is a dull, preachy film.

By the thirties, this dichotomy was quite apparent. Films that fell into the science fiction category were either moralistic bores, such as "Things to Come" (based on H. G. Wells's writing), or special-effect-happy adventure tales, like "Transatlantic Tunnel," where the jut-jawed hero drills

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through underwater volcanoes to link London with New York.

The money people who control the film industry quickly realized that adventure, exotic backgrounds, and pyrotechnical special effects (plus short skirts on the women) made more lucrative movies than idea-rich morality plays. Very rarely since then have innovative special effects been combined with truly strong stories, as was done in the now-classic "2001: A Space Odyssey," by Stanley Kubrick and Arthur C. Clarke. Many things have been written about that film, but it accomplished something that few SF movies have even tried to do: it forced the audience to think.

Once in a great while, good science fiction has been produced in strong films that needed little or no special effects gimmickry.

"The Man in the White Suit," starring Alec Guiness, accomplished marvels of insight into the dilemma of the scientist who *must* do his research despite all the obstacles that society throws in his path. Its only real "effect" was that marvelous "gloop-gloop"—ing chemical rig in which Guiness cooked up his indestructible fabric.

"Charlie" was a landmark film in several respects. It had no obvious special effects. It depended on an intelligent script from a prize-winning SF story. It is the only SF film in the history of the universe in which a performer, Cliff Robertson, won an Academy Award for *acting*.

Neither "Star Wars" nor "Close Encounters" features Oscar-level performances by anyone—except the special effects teams and the sound mixers. Both films jar the ears, and there are some social scientists who wonder out loud if we are not seeing (or rather, hearing) films that are made for the quadraphonic rock music generation—a generation that has permanently impaired its hearing by too much wattage in their amplifiers.

Be that as it may, what is the common thread that ties these films together and makes them so popular? It's certainly not the same qualities that motivate you to read this magazine. The stories in both films are negligible. There is no character development among the matchstick figures that inhabit either film. Most of the classic qualities of high drama are not only missing, they are totally ignored by filmmakers George Lucas and Steven Spielberg.

But they hit on something.

We used to call it "a sense of wonder." Both films show millions of viewers who have seldom (if ever) read a science fiction story that there are wondrous worlds to be seen, to be experienced, worlds and ideas beyond our everyday lives. "Star Wars" allows the audience to turn off its brain completely and spend a couple of hours in a hypnotic funk as spaceships roar, zapguns zap, robots whistle and shriek, people run, jump and otherwise cavort madly against a backdrop of flashing, blinking, exploding thingamabobs. Everyone can revert to infantile fantasy. It's like watching

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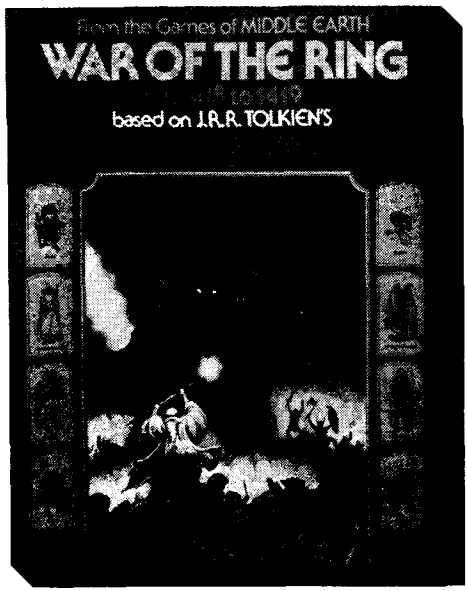

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your very first Christmas tree and the toy train chugging around its base.

In "Close Encounters" there's an attempt to say something different, but hardly deeper. The real theme of the film is expressed in a song borrowed from Disney, "When You Wish Upon a Star." Mr. Average American can cope with a visitation from another world better than the combined powers of government and science. It's the kind of science fiction that Frank Capra would have loved.

Behind all the special effects and the derring-do, these two films—like most SF movies—exhibit a fundamental set of beliefs that stem not from the science fiction material *per se*, but from the minds of the movie people who produced the films. Let me illustrate this with a personal reminiscence.

Several years ago, Harlan Ellison and I were working (or trying to) with a team of movie/TV people Out There in Hollywood. They had taken a fancy to our co-authored story, "Brillo," which had been published in Analog in August 1970. The basic concept behind "Brillo" was simple, and not all that extraordinary: people insist that they want swift, impartial, efficient law enforcement from their police force—except when that swift, impartial, efficient police force catches *them* in a misdemeanor. Then they want lenient, forgiving, winking cops who'll let them off the hook with a good-natured warning.

So we wrote about a two-person team of police officers: one a very human, somewhat fallible man; the other a machine, a robot, that was programmed to always go "by the book."

The Hollywood people loved the idea, but what they saw in it was a Laurel-and-Hardy team with transistors instead of custard pies. They insisted that in each story, the human cop must always be shown to be superior to the robot. No matter that the robot was indestructible, untiring, incorruptible, and had instantaneous access to every criminal file in the nation. The human police officer had to produce the emotional insight that would solve the case. Every time.

In other words, they took a story that examined the interfaces between man and machine—social, economic, political, emotional interfaces—and reduced it to a Mutt and Jeff routine where no matter how smart the machine was, the human always came out ahead.

Even in as redoubtable a TV series as "Star Trek," the same fearful thinking ruled every program. Let's face it, Spock was the best person on the dear old *Enterprise*, and was much more capable of commanding the ship and its crew than Captain Kirk. But Spock stood for unemotional intelligence, while Kirk represented emotional humanity. Emotion must always be shown superior to brains, Out There in Tinsel Land. (If they *produced* movies by listening to their hearts instead of their heads, we'd get fewer retreads and maybe some interesting creative works to enjoy!)

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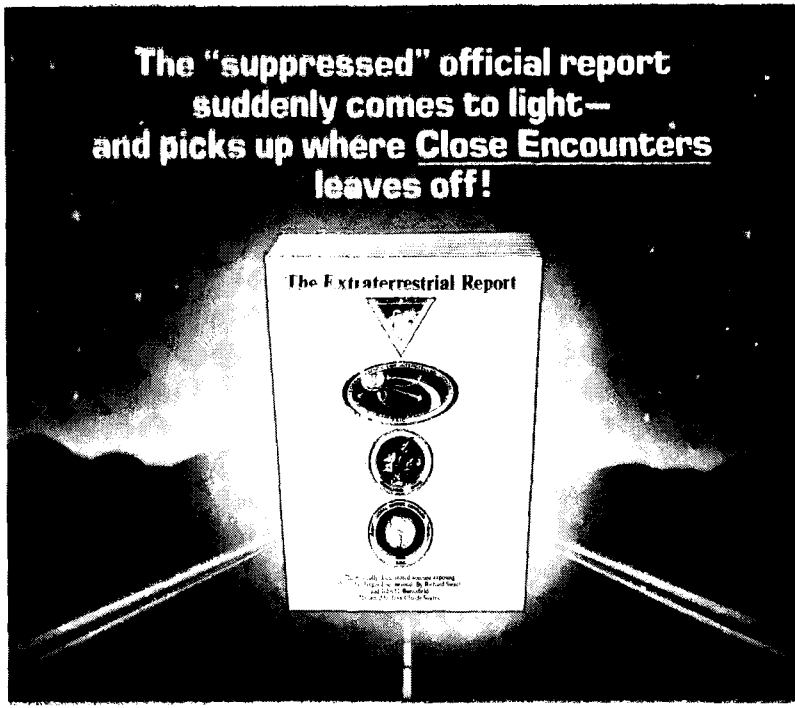

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But this heart-over-head attitude is solidly in the mainstream tradition of American theater and motion pictures. The "natural" farmer always outsmarts the city slicker. Rural values always prevail over urban values. Pitchforks are benign; nuclear reactors evil. "There are some things, Dr. Frankenstein, that man was not meant to tamper with."

Think a moment of the dumbest science fiction movie ever made, "Silent Running." Bruce Dern was supposed to be an ecologist (whatever that is) who is taking the last surviving green plants of Earth to a safe haven in space. In the name of ecology—a "good" word in Hollywood—Dern murders his shipmates and even manages to get himself killed. All the time he's doing this, he's driving his spacecraft out toward the orbit of Saturn, and then he wonders why the plants are doing poorly, ten times farther from the Sun than their natural habitat! But he's on the side of the plants and therefore he's a "good guy."

"Close Encounters" does much the same thing. The truckdriving hero is the guy the aliens really want to deal with. The scientists are left standing in the desert with their mouths hanging open while Joe Everyman happily lifts off for the stars.

"Star Wars" goes even further. The acne-prone hero is told, during the crucial dogfight, to ignore his ship's computer and all the other advanced hardware around him and "trust the Force."

It's like "The Music Man's" Professor Harold Hill telling his suckers to "think Mozart" because he hasn't the faintest idea of how to teach them to play the band instruments he's sold them.

"Trust the Force." In the film, it all comes out happily. With the aid of "the Force" the hero plants his bomb exactly in the one place where the super-dooper bad guys are vulnerable, and all the problems are solved in a titanic explosion.

"Trust the Force." Wishing will make it true. What a wonderful philosophy for a slave! The Fuhrer has all the answers. The President knows more about this than we do, so he must be right. Just buy this product and your love life will be wonderful.

This is the very antithesis of the philosophy of science, and of science fiction, which states over and over again that human beings have the brains to understand the world, and to shape it to their own needs and desires. In science fiction, we are not passive patsies who wait for a voice to whisper in our ears before we know what to do. Science fiction insists on human rationality—and responsibility.

So, although "Star Wars" and "Close Encounters" are delighting millions and making their backers rich, neither film can be regarded seriously as science fiction. In fact, they bear the same relationship to science fiction as the Nazi treatment of Poland bore to the Ten Commandments. ■

THE EDITOR

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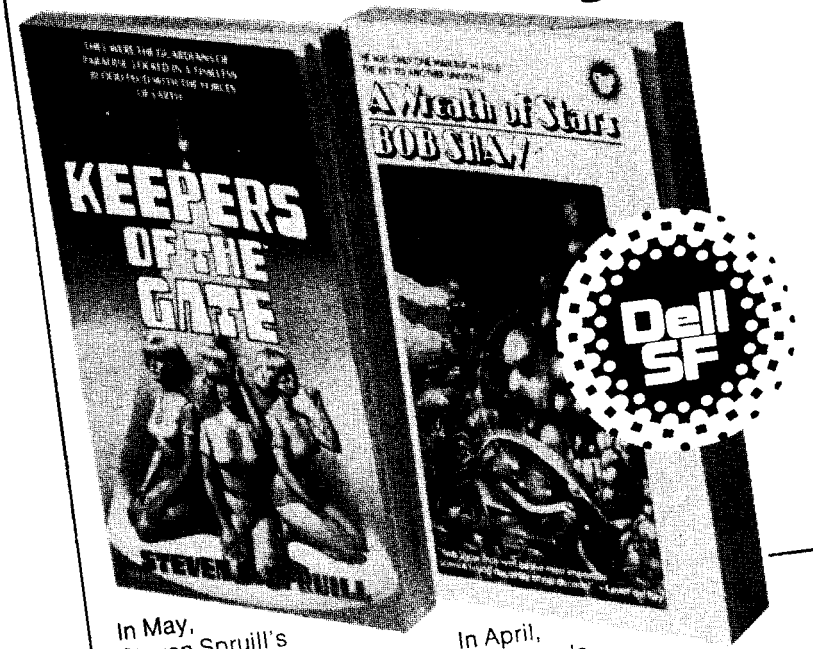
DELL'S SENSATIONAL SF NOVELS FOR SPRING



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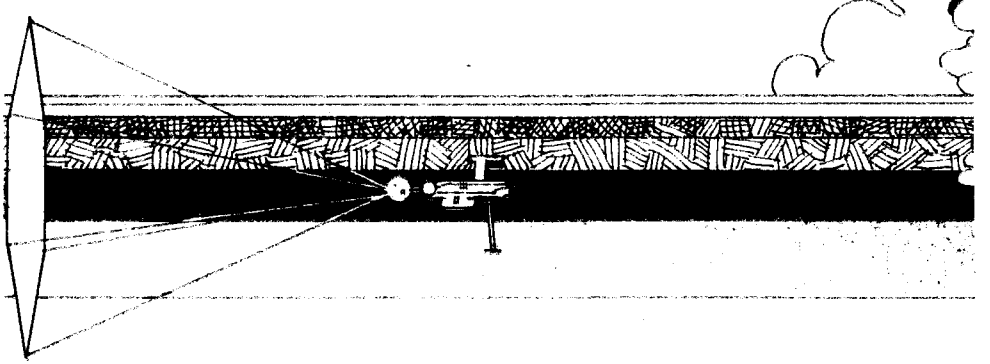
VIEW FROM A HEIGHT

The race is not always to the swift,
nor even to the persistent–
it is sometimes won by the reluctant.

JOAN D. VINGE



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RON MILLER

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SATURDAY, THE 7TH

I want to know why those pages were missing! How am I supposed to keep up with my research if they leave out pages—?

(*Long sighing noise.*)

Listen to yourself, Emmylou: You're listening to the sound of fear. It was an oversight, you know that. Nobody did it to you on purpose. Relax, you're getting Fortnight Fever. Tomorrow you'll get the pages, and an apology too, if Harvey Weems knows what's good for him.

But still, five whole pages; and the table of contents. How could you miss *five* pages? And the table of contents.

How do I know there hasn't been a coup? The Northwest's finally taken over completely, and they're censoring the media—And like the Man without a Country, everything they send me from now on is going to have holes cut in it.

In *Science*?

Or maybe Weems has decided to drive me insane—?

Oh, my God . . . it would be a short trip. Look at me. I don't have any fingernails left.

("*Arrwk. Hello, beautiful. Hello? Hello?*")

("Ozymandias! Get out out of my hair, you devil." *Laughter.* "Polly want a cracker? Here . . . gently! That's a boy.")

It's beautiful when he flies. I never get tired of watching him, or looking at him, even after twenty years. Twenty years. . . . What did the *psittacidae* do, to win the right to wear a rainbow as their plumage? Although the way we've hunted them for it, you could say it was a mixed blessing. Like some other things.

Twenty years. How strange it sounds to hear those words, and know they're true. There are gray hairs when I look in the mirror. Wrinkles starting. And Weems is bald! Bald as an egg, and all squinty behind his spectacles. How did we get that way, without noticing it? Time is both longer and shorter than you think, and usually all at once.

Twelve days is a long time to wait for somebody to return your call. Twenty years is a long time gone. But I feel somehow as though it was only last week that I left home. I keep the circuits clean, going over them and over them, showing those mental home movies until I could almost step across, sometimes, into that other reality. But then I always look down, and there's that tremendous abyss full of space and time, and I realize I can't, again. You can't go home again.

Especially when you're almost one thousand astronomical units out in space. Almost there, the first rung of the ladder. Next Thursday is the day. Oh, that bottle of champagne that's been waiting for so long. Oh, the parallax view! I have the equal of the best astronomical equipment in all of near-Earth space at my command, and a view of the universe that no one has ever had before; and using them has made me the only astrophysicist ever to win a PhD in deep space. Talk about your field work.

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Strange to think that if the Forward Observatory had massed less than its thousand-plus tons, I would have been replaced by a machine. But because the installation is so large, I in my infinite human flexibility, even with my infinite human appetite, become the most efficient legal tender. And the farther out I get the more important my own ability to judge what happens, and respond to it, becomes. The first—and maybe the last—manned interstellar probe, on a one-way journey into infinity . . . into a universe unobscured by our own system's gases and dust . . . equipped with eyes that see everything from gamma to ultra-long wavelengths, and ears that listen to the music of the spheres.

And Emmylou Stewart, the captive audience. Adrift on a star . . . if you hold with the idea that all the bits of inert junk drifting through space, no matter how small, have star potential. Dark stars, with brilliance in their secret hearts, only kept back from letting it shine by Fate, which denied them the critical mass to reach their kindling point.

Speak of kindling: the laser beam just arrived to give me my daily boost, moving me a little faster, so I'll reach a little deeper into the universe. Blue sky at bedtime; I always was a night person. I'm sure they didn't design the solar sail to filter light like the sky . . . but I'm glad it happened to work out that way. Sky-blue was always my passion—the color, texture, fluid purity of it. This color isn't exactly right; but it doesn't matter, because I can't remember how any more. This sky is a sun-catcher. A big blue parasol. But so was the original, from where I used to stand. The sky is a blue parasol . . . did anyone ever say that before, I wonder? If anyone knows, speak up—

Is anyone even listening. Will anyone ever be?

("Who cares, anyway? Come on, Ozzie—climb aboard. Let's drop down to the observation porch while I do my meditation, and try to remember what days were like.")

Weems, damn it, I want satisfaction!

SUNDAY, THE 8TH

That idiot. That intolerable moron—how could he do that to me? After all this time, wouldn't you think he'd know me better than that? To keep me waiting for twelve days, wondering and afraid: twelve days of all the possible stupid paranoias I could weave with my idle hands and mind, making myself miserable, asking for trouble—

And then giving it to me. God, he must be some kind of sadist! If I could only reach him, and hurt him the way I've hurt these past hours—

Except that I know the news wasn't his fault, and that he didn't mean to hurt me . . . and so I can't even ease my pain by projecting it onto him.

I don't know what I would have done if his image hadn't been six days stale when it got here. What would I have done, if he'd been in earshot when I was listening; what would I

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have said? Maybe no more than I did say.

What can you say, when you realize you've thrown your whole life away?

He sat there behind his faded blotter, twiddling his pen, picking up his souvenir moon rocks and laying them down—looking for all the world like a man with a time bomb in his desk drawer—and said, "Now don't worry, Emmylou. There's no problem . . ." Went on saying it, one way or another, for five minutes; until I was shouting, "What's *wrong*, damn it?"

"I thought you'd never even notice the few pages . . ." with that sidling smile of his. And while I'm muttering, "I may have been in solitary confinement for twenty years, Harvey, but it hasn't turned my brain to mush," he said,

"So maybe I'd better explain, first—" and the look on his face; oh, the look on his face. "There's been a biomed breakthrough. If you were here on Earth, you . . . well, your body's immune responses could be . . . made normal . . ." And then he looked down, as though he could really see the look on my own face.

Made normal. Made normal. It's all I can hear. I was born with no natural immunities. No defense against disease. No help for it. No. *No, no, no*; that's all I ever heard, all my life on Earth. Through the plastic walls of my sealed room; through the helmet of my sealed suit. . . . And now it's all changed. They could cure me. But I can't go home. I knew this could happen; I knew it had to happen someday. But I chose to ignore that fact, and now it's too late to do anything about it.

Then why can't I forget that I could have been f-free. . . .

. . . I didn't answer Weems today. Screw Weems. There's nothing to say. Nothing at all.

I'm so tired.

MONDAY, THE 9TH

Couldn't sleep. It kept playing over and over in my mind. . . . Finally took some pills. Slept all day, feel like hell. Stupid. And it didn't go away. It was waiting for me, still waiting, when I woke up.

It isn't fair—!

I don't feel like talking about it.

TUESDAY, THE 10TH

Tuesday, already. I haven't done a thing for two days. I haven't even started to check out the relay beacon, and that damn thing has to be dropped off this week. I don't have any strength; I can't seem to move, I just sit. But I have to get back to work. Have to . . .

Instead I read the printout of the article today. Hoping I'd find a flaw! If that isn't the greatest irony of my entire life. For two decades I prayed that somebody would find a cure for me. And for two more decades I didn't care. Am I going to spend the next two decades hating it, now that it's been found?

No . . . hating myself. I could have been free, they could have cured me; if only I'd stayed on Earth. If only I'd

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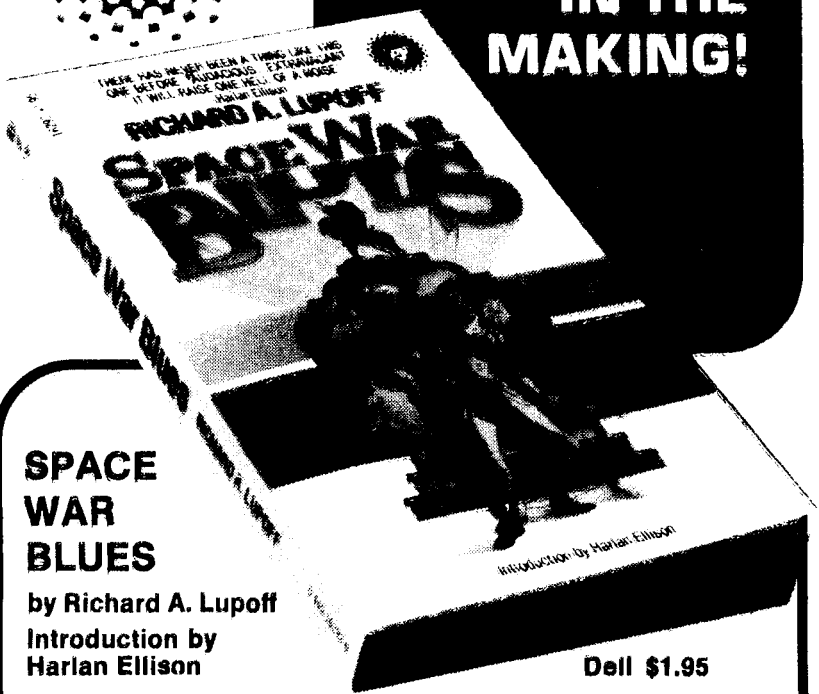

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been patient. But now it's too late . . . by twenty *years*.

I want to go home. I want to go home. . . . But you can't go home again. Did I really say that, so blithely, so recently? *You* can't: You, Emmylou Stewart. You are in prison, just like you have always been in prison.

It's all come back to me so strongly. Why me? Why must I be the ultimate victim— In all my life I've never smelled the sea wind, or plucked berries from a bush and eaten them, right there! Or felt my parents' kisses against my skin, or a man's body. . . . Because to me they were all deadly things.

I remember when I was a little girl, and we still lived in Victoria—I was just three or four, just at the brink of understanding that I was the only prisoner in my world. I remember watching my father sit polishing his shoes in the morning, before he left for the museum. And me smiling, so deviously, "Daddy . . . I'll help you do that, if you let me come out—"

And he came to the wall of my bubble and put his arms into the hugging gloves, and said, so gently, "No." And then he began to cry. And I began to cry too, because I didn't know why I'd made him unhappy. . . .

And all the children at school, with their 'spaceman' jokes, pointing at the freak; all the years of insensitive people asking the same stupid questions every time I tried to go out anywhere . . . worst of all, the ones who weren't stupid, or insensitive. Like Jeffrey . . . no, I will not think about Jeffrey! I couldn't let myself think about him then. I could never afford to get close to a man, because I'd never be able to touch him. . . .

And now it's too late. Was I controlling my fate, when I volunteered for this one-way trip? Or was I just running away from a life where I was always helpless; helpless to escape the things I hated, helpless to embrace the things I loved.

I pretended this was different, and important . . . but was that really what I believed? No! I just wanted to crawl into a hole I couldn't get out of, because I was so afraid.

So afraid that one day I would unseal my plastic walls, or take off my helmet and my suit; walk out freely to breathe the air, or wade in a stream, or touch flesh against flesh . . . and die of it.

So now I've walled myself into this hermetically sealed tomb for a living death. A perfectly sterile environment, in which my body will not even decay when I die. Never having really lived, I shall never really die, dust to dust. A perfectly sterile environment; in every sense of the word.

I often stand looking at my body in the mirror after I take a shower. Hazel eyes, brown hair in thick waves with hardly any gray . . . and a good figure; not exactly stacked, but not unattractive. And no one has ever seen it that way but me. Last night I had the Dream again . . . I haven't had it for such a long time . . . this time I was sitting on a carved wooden beast in the

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park beside the Provincial Museum in Victoria; but not as a child in my suit. As a college girl, in white shorts and a bright cotton shirt, feeling the sun on my shoulders, and—Jeffrey's arms around my waist. . . . We stroll along the bayside hand in hand, under the Victorian lamp posts with their bright hanging flower-baskets, and everything I do is fresh and spontaneous and full of the moment. But always, always, just when he holds me in his arms at last, just as I'm about to . . . I wake up.

When we die, do we wake out of reality at last, and all our dreams come true? When I die . . . I will be carried on and on into the timeless depths of uncharted space in this computerized tomb, unmourned and unremembered. In time all the atmosphere will seep away; and my fair corpse, lying like Snow White's in inviolate sleep, will be sucked dry of moisture, until it is nothing but a mummified parchment of shriveled leather and bulging bones. . . .

("*Hello? Hello, baby? Good night. Yes, no, maybe. . . . Awk. Food time!*")

("Oh, Ozymandias! Yes, yes, I know . . . I haven't fed you, I'm sorry. I know, I know . . .")

(*Clinks and rattles.*)

Why am I so selfish? Just because I can't eat, I expect him to fast, too. . . . No. I just forgot.

He doesn't understand, but he knows something's wrong; he climbs the lamp pole like some tripodal bem, using both feet and his beak, and

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stares at me with that glass-beady bird's eye, stares and stares and mumbles things. Like a lunatic! Until I can hardly stand not to shut him in a cupboard, or something. But then he sidles along my shoulder and kisses me—such a tender caress against my cheek, with that hooked prehensile beak that could crush a walnut like a grape—to let me know that he's worried, and he cares. And I stroke his feathers to thank him, and tell him that it's all right . . . but it's not. And he knows it.

Does he ever resent his life? Would he, if he could? Stolen away from his own kind, raised in a sterile bubble to be a caged bird for a caged human. . . .

I'm only a bird in a gilded cage. I want to go home.

WEDNESDAY, THE 11TH

Why am I keeping this journal? Do I really believe that sometime some alien being will find this, or some starship from Earth's glorious future will catch up to me . . . glorious future, hell. Stupid, selfish, short-sighted fools. They ripped the guts out of the space program after they sent me away, no one will ever follow me now. I'll be lucky if they don't declare me dead and forget about me.

As if anyone would care what a woman all alone on a lumbering space probe thought about day after day for decades, anyway. What monstrous conceit.

I did lubricate the bearings on the big scope today. I did that much. I did it so that I could turn it back toward Earth . . . toward the sun . . . toward the whole damn system. Because I can't even see it, all crammed into the space of two moon diameters, even Pluto; and too dim and small and faraway below me for my naked eyes, anyway. Even the sun is no more than a gaudy star that doesn't even make me squint. So I looked for them with the scope. . . .

Isn't it funny how when you're a child you see all those drawings and models of the solar system with big, lumpy planets and golden wakes streaming around the sun. Somehow you never get over expecting it to look that way in person. And here I am, one thousand astronomical units north of the solar pole, gazing down from a great height . . . and it doesn't look that way at all. It doesn't look like anything; even through the scope. One great blot of light, and all the pale tiny diamond chips of planets and moons around it, barely distinguishable from half a hundred undistinguished stars trapped in the same arc of blackness. So meaningless, so insignificant . . . so disappointing.

Five hours I spent, today, listening to my journal, looking back and trying to find—something, I don't know, something I suddenly don't have anymore.

I had it at the start. I was disgusting; Pollyanna Grad-student skipping and singing through the rooms of my very own observatory. It seemed like heaven, and a lifetime spent in it couldn't possibly be long enough for

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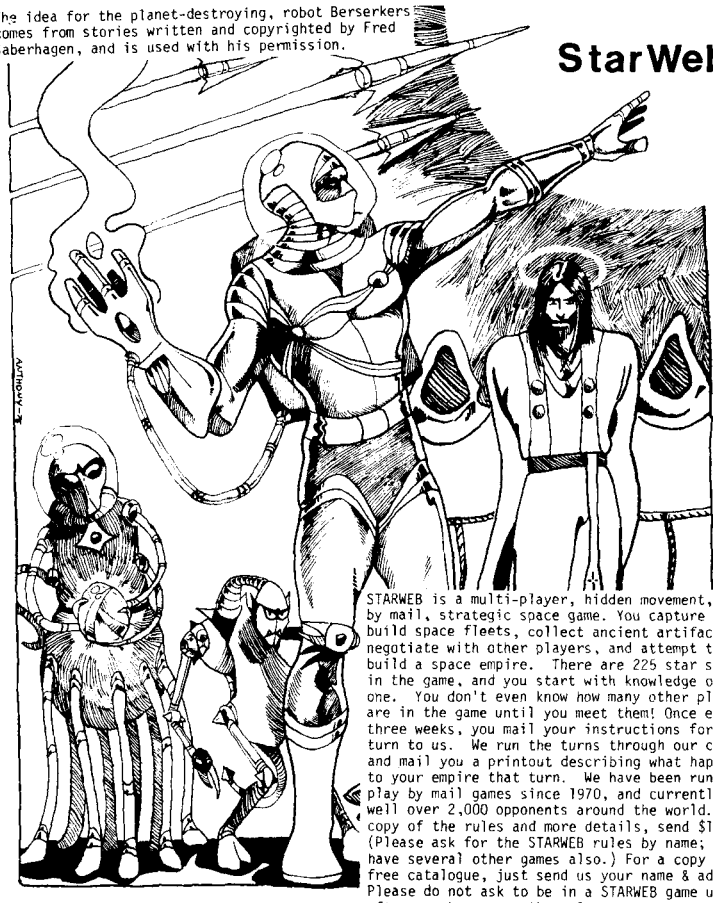
StarWeb



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all that I was going to accomplish, and discover. I'd never be bored, no, not me. . . .

And there was so much to learn about the potential of this place, before I got out to where it supposedly would matter, and there would be new things to turn my wonderful extended senses toward . . . while I could still communicate easily with my dear mentor Dr. Weems, and the world. (Who'd ever have thought, when the lecherous old goat was my thesis advisor at Harvard, and making jokes to his other grad students about "the lengths some women will go to to protect their virginity," that we would have to spend a lifetime together.)

There was Ozymandias's first word . . . and my first birthday in space, and my first anniversary . . . and my doctoral degree at last, printed out by the computer with scrolls made of little *x*'s and taped up on the wall. . . .

Then day and night and day and night, beating me black and blue with blue and black . . . my fifth anniversary, my eighth, my decade. I crossed the magnetopause, to become truly the first voyager in interstellar space . . . but by then there was no one left to *talk* to anymore, to really share the experience with. Even the radio and television broadcasts drifting out from Earth were diffuse and rare; there were fewer and fewer contacts with the reality outside. The plodding routines, the stupifying boredom—until sometimes I stood screaming down the halls just for something new; listening to the echoes that no one else would ever hear, and pretending they'd come to call; trying so hard to believe there was something to hear that wasn't *my* voice, *my* echo, or Ozymandias making a mockery of it.

("*Hello, beautiful. That's a crock. Hello, hello?*")

("Ozymandias, get *away* from me—")

But always I had that underlying belief in my mission: that I was here for a purpose, for more than my own selfish reasons, or NASA's (or whatever the hell they call it now), but for Humanity, and Science. Through meditation I learned the real value of inner silence, and thought that by creating an inner peace I had reached equilibrium with the outer silences. I thought that meditation had disciplined me, I was in touch with my self and with the soul of the cosmos. . . . But I haven't been able to meditate since—it happened. The inner silence fills up with my own anger screaming at me, until I can't remember what peace sounds like.

And what have I really discovered, so far? Almost nothing. Nothing worth wasting my analysis or all my fine theories—or my freedom—on. Space is even emptier than anyone dreamed, you could count on both hands the bits of cold dust or worldlet I've passed in all this time, lost souls falling helplessly through near-perfect vacuum . . . all of us together. With my absurdly long astronomical tape-measure I have fixed precisely the distance to NGC 2419 and a few other

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features, and from that made new estimates about a few more distant ones. But I have not detected a miniature black hole insatiably vacuuming up the vacuum; I have not pierced the invisible clouds that shroud the ultra-long wavelengths like fog; I have not discovered that life exists beyond the Earth in even the most tentative way. Looking back at the solar system I see nothing to show definitively that we even exist, anymore. All I hear anymore when I scan is electromagnetic noise, no coherent thought. Only Weems every twelfth night, like the last man alive. . . . Christ, I still haven't answered him.

Why bother? Let him sweat. Why bother with any of it. Why waste my precious time.

Oh, my precious time. . . . Half a lifetime left that could have been mine, on Earth.

Twenty years—I came through them all all right. I thought I was safe. And after twenty years, my facade of discipline and self-control falls apart at a touch. What a self-deluded hypocrite I've been. Do you know that I said the sky was like a blue parasol eighteen years ago? And probably said it again fifteen years ago, and ten, and five—

Tomorrow I pass 1000 AUs.

THURSDAY, THE 12TH

I burned out the scope. I burned out the scope. I left it pointing toward the Earth, and when the laser came on for the night it shone right down the scope's throat and burned it out. I'm so ashamed. . . . Did I do it on purpose, subconsciously?

("*Goodnight starlight. Arrk. Good night. Good . . .*")

("Damn it, I want to hear another human voice—!")

(*Echoing, "voice, voice, voice voice . . .*")

When I found out what I'd done I ran away. I ran and ran through the halls. . . . But I only ran in a circle: This observatory, my prison, myself . . . I can't escape. I'll always come back in the end, to this green-walled room with its desk and its terminals, its cupboards crammed with a hundred thousand dozens of everything, toilet paper and magnetic tape and oxygen tanks. . . . And I can tell you exactly how many steps it is to my bedroom or how long it took me to crochet the afghan on the bed . . . how long I've sat in the dark and silence, setting up an exposure program or listening for the feeble pulse of a radio galaxy two billion light-years away. There will never be anything different, or anything more.

When I finally came back here, there was a message waiting. Weems, grinning out at me half-bombed from the screen—"Congratulations," he cried, "on this historic occasion! Emmylou, we're having a little celebration here at the lab; mind if we join you in yours, one thousand astronomical units from home—?" I've never seen him drunk. They really must have meant to do something nice for me, planning it all six days ahead. . . .

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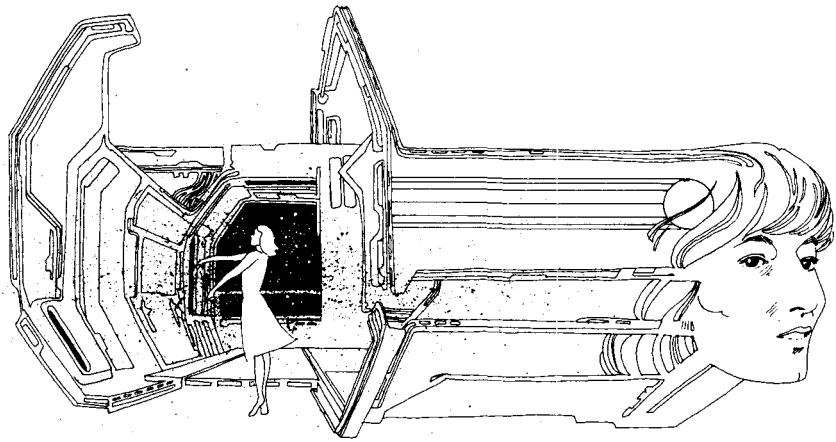

To celebrate I shouted obscenities I didn't even know I knew at him, until my voice was broken and my throat was raw.

Then I sat at my desk for a long time with my jackknife lying open in my hand. Not wanting to die—I've always been too afraid of death for that—but wanting to hurt myself. I wanted to make a fresh hurt, to take my attention off the terrible thing that is sucking me into myself like an imploding star. Or maybe just to punish myself, I don't know. But I considered the possibility of actually cutting myself quite calmly; while some separate part of me looked on in horror. I even pressed the knife against my flesh . . . and then I stopped and put it away. It hurts too much.

I can't go on like this. I have duties, obligations, and I can't face them. What would I do without the emergency automechs? . . . But it's the rest of my life, and they can't go on doing my job for me forever—

Later.

I just had a visitor. Strange as that sounds. Stranger yet—it was Donald Duck. I picked up half of a children's cartoon show today, the first coherent piece of nondirectional, unbeamed televison broadcast I've recorded in months. And I don't think I've ever been happier to see anyone in my life. What a nice surprise, so glad you could drop by. . . . Ozymandias loves him; he hangs upside down from his swing under the cabinet with a cracker in one foot, cackling away and saying,

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"Give us a kiss, *smack-smack-smack*". . . . We watched it three times. I even smiled, for a while; until I remembered myself. It helps. Maybe I'll watch it again until bedtime.

FRIDAY, THE 13TH

Friday the Thirteenth. Amusing. Poor Friday the Thirteenth, what did it ever do to deserve its reputation? Even if it had any power to make my life miserable, it couldn't hold a candle to the rest of this week. It seems like an eternity since last weekend.

I repaired the scope today; replaced the burnt-out parts. Had to suit up and go outside for part of the work . . . I haven't done any outside maintenance for quite a while. Odd how both exhilarating and terrifying it always is when I first step out of the airlock, utterly alone, into space. You're entirely on your own, so far away from any possibility of help, so far away from anything at all. And at that moment you doubt yourself, suddenly, terribly . . . just for a moment.

But then you drag your umbilical out behind you and clank along the hull in your magnetized boots that feel so reassuringly like lead ballast. You turn on the lights and look for the trouble, find it and get to work, it doesn't bother you anymore. . . . When your life seems to have torn loose and be drifting free, it creates a kind of sea anchor to work with your hands; whether it's doing some mindless routine chore or the most intricate of repairs.

There was a moment of panic, when I actually saw charred wires and melted metal, when I imagined the damage was so bad that I couldn't repair it again. It looked so final, so—masterful. I clung there by my feet and whimpered and clenched my hands inside my gloves, like a great shining baby, for a while. But then I pulled myself down and began to pry here and unscrew there and twist a component free . . . and little by little I replaced everything. One step at a time; the way we get through life.

By the time I'd finished I felt quite calm, for the first time in days; the thing that's been trying to choke me to death this past week seemed to falter a little at my demonstration of competence. I've been breathing easier since then; but I still don't have much strength. I used up all I had just overcoming my own inertia.

But I shut off the lights and hiked around the hull for a while, afterwards—I couldn't face going back inside just then. Looking at the black convex dish of the solar sail I'm embedded in, up at the radio antenna's smaller dish occluding stars as the observatory's cylinder wheels endlessly at the hub of the spinning parasol. . . .

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That made me dizzy, and so I looked out into the starfields that lie on every side. Even with my own poor, unaugmented senses there's so much more to see out here, unimpeded by atmosphere or dust, undominated by any sun's glare. The brilliance of the Milky Way, the depths of star and nebula and farthest galaxy breathlessly suspended . . . as I am. The realization that I'm lost for eternity in an uncharted sea.

Strangely, although that thought aroused a very powerful emotion when it struck me, it wasn't a negative one at all: It was from another scale of values entirely; like the universe itself. It was as if the universe itself stretched out its finger to touch me. And in touching me, singling me out, it only heightened my awareness of my own insignificance.

That was somehow very comforting. When you confront the absolute indifference of magnitudes and vistas so overwhelming, the swollen ego of your self-important suffering is diminished. . . .

And I remembered one of the things that was always so important to me about space—that here *any*one has to put on a spacesuit before they step outside. We're all aliens, no one better equipped to survive than another. I am as normal as anyone else, out here.

I must hold onto that thought.

SATURDAY, THE 14TH

There is a reason for my being here. There is a reason.

I was able to meditate earlier today. Not in the old way, the usual way, by emptying my mind. Rather by letting the questions fill up the space, not fighting them; letting them merge with my memories of all that's gone before. I put on music, that great mnemonic stimulator; letting the images that each tape evoked free-associate and interact.

And in the end I could believe again that my being here was the result of a free choice. No one forced me into this. My motives for volunteering were entirely my own. And I was given this position because NASA believed that I was more likely to be successful in it than anyone else they could have chosen.

It doesn't matter that some of my motives happened to be unresolved fear or wanting to escape from things I couldn't cope with. It really doesn't matter. Sometimes retreat is the only alternative to destruction, and only a madman can't recognize the truth of that. Only a madman. . . . Is there anyone 'sane' on Earth who isn't secretly a fugitive from something unbearable somewhere in their life? And yet they function normally.

If they ran, they ran toward something, too, not just away. And so did I. I had already chosen a career as an astrophysicist before I ever dreamed of being a part of this project. I could have become a medical researcher instead, worked on my own to find a cure for my condition. I could have grown up hating the whole idea of space and "spacemen," stumbling

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through life in my damned ugly sterile suit. . . .

But I remember when I was six years old, the first time I saw a film of suited astronauts at work in space . . . they looked just like me! And no one was laughing. How could I help but love space, then?

(And how could I help but love Jeffrey, with his night-black hair, and his blue flightsuit with the starry patch on the shoulder. Poor Jeffrey, poor Jeffrey, who never even realized his own dream of space before they cut the program out from under him. . . . I will not talk about Jeffrey. I will not.)

Yes, I could have stayed on Earth, and waited for a cure! I knew even then there would have to be one, someday. It was both easier and harder to choose space, instead of staying.

And I think the thing that really decided me was that those people had faith enough in me and my abilities to believe that I could run this observatory and my own life smoothly for as long as I lived. Billions of dollars and a thousand tons of equipment resting on me; like Atlas holding up his world.

Even Atlas tried to get rid of his burden; because no matter how vital his function was, the responsibility was still a burden to him. But he took his burden back again too, didn't he; for better or worse. . . .

I worked today. I worked my butt off getting caught up on a week's worth of data processing and maintenance, and I'm still not finished. Dis-

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covered while I was at it that Ozymandias had used those missing five pages just like the daily news, crapped all over them. My sentiments exactly! I laughed and laughed.

I think I may live.

SUNDAY, THE 15TH

The clouds have parted.

That's not rhetorical—among my fresh processed data is a series of photo reconstructions in the ultra long wavelengths. And there's a gap in the obscuring gas up ahead of me, a break in the clouds that extends thirty or forty light years. Maybe fifty! Fantastic. What a view. What a view I have from here of everything, with my infinitely extended vision of the way ahead, of the passing scene—or looking back toward Earth.

Looking back. I'll never stop looking back, and wishing it could have been different. That at least there could have been two of me, one to be here, one who could have been normal, back on Earth, so that I wouldn't have to be forever torn in two by regrets . . .

("*Hello. What's up, doc?* Avast!")

("Hey, watch it! If you drink, don't fly.")

Damn bird. . . . If I'm getting maudlin, it's because I had a party today. Drank a whole bottle of champagne. Yes, I had *the* party . . . we did, Ozymandias and I. Our private 1000 AU celebration. Better late than never, I guess. At least we did have something concrete to celebrate—the photos. And if the celebration wasn't quite as merry as it could have been, still I guess it will probably seem like it was when I look back on it from the next one, at 2000 AUs. They'll be coming faster now, the celebrations. I may even live to celebrate 8000. What the hell, I'll shoot for 10,000 . . .

After we finished the champagne . . . Ozymandias thinks '98 was a great year, thank God he can't drink as fast as I can . . . I put on my Strauss waltzes, and the *Barcarolle*. Oh, the Berliner Philharmonic, their touch is what a lover's kiss must be. I threw the view outside onto the big screen, a ballroom of stars, and danced with my shadow. And part of the time I wasn't dancing above the abyss in a jumpsuit and headphones, but waltzing in yards of satin and lace across a ballroom floor in 19th century Vienna. What I wouldn't give to be *there* for a moment out of time. Not for a lifetime, or even a year, but just for an evening, just for one waltz.

Another thing I shall never do. There are so many things we can't do, any of us, for whatever the reasons—time, talent, life's callous whims. We're all on a one way trip into infinity. If we're lucky we're given some life's work we care about, or some person. Or both, if we're very lucky.

And I do have Weems. Sometimes I see us like an old married couple, who have grown to a tolerant understanding over the years. We've never been soul mates, God knows, but we're comfortable with each others' silences. . . .

I guess it's about time I answered him. ■

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What shape is a catastrophe?

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Nature isn't always smoothly predictable. Catastrophe theory is a new mathematical technique for examining sudden changes—including your reaction to this new theory!

IAN STEWART

He knew now that this was indeed a cusp of necessity . . . but he resolved to balance on the point of the cusp until he grokked all.

ROBERT E. HEINLEIN
Stranger In a Strange Land

Changes in Nature come in two distinctive types: smooth and sudden. The gentle but relentless motion of the planets around the Sun under the influence of their mutual gravitational fields is an example of the first type; the sudden collapse of a steel bar under increasing load exemplifies the second. On the whole, the methods of mathematical physics are more successful at handling smooth changes than sudden ones. However, the sudden ones are often more interesting, especially when the discontinuity seems to arise spontaneously out of gradual changes in the surroundings. It came as a nasty surprise to nineteenth century mathematicians to discover that their nice, smooth equations of fluid flow, fed with smooth data, could generate abrupt shockwaves. It has come as an equally nasty surprise to ecologists that their nice, deterministic equations of population change can, under smooth variations, suddenly develop apparently structureless and random fluctuations which in despair they have christened *chaos*.

When pursued mathematically these problems lead inexorably to questions in *topology* (popularly described as "rubber-sheet geometry") since this is the natural language for

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describing continuity or discontinuity. The pioneering work of the American mathematician Stephen Smale has revolutionized our understanding of the dynamical processes involved. In 1972 the French mathematician René Thom published a book [1] in which he argued that this topological theory of dynamical systems could provide a broad framework for the discussion of the development of form in nature, especially in biological morphogenesis. Because of the puzzling way in which these discontinuities are engendered by smooth variations, Thom dubbed them *catastrophes*. The subject rapidly acquired the name *catastrophe theory*.

Thom's book is a kind of philosophico-mathematical treatise, which mixes mathematics and speculation in roughly equal doses. One of the more accessible parts is a classification of a special class of discontinuities, the *elementary catastrophes*. There are seven of them, and each has its own distinctive geometry: it is often possible to recognize an elementary catastrophe by its (multidimensional) *shape*. They are "elementary" in the same sense that "elementary particles" in physics are: they provide fundamental building blocks for more complicated catastrophes.

These ideas open up a program for understanding sudden changes in natural phenomena. First, explore the inner structure of the elementary catastrophes. Next, find out how they can be assembled to give more complicated catastrophes. (In a fanciful analogy of Zeeman's, Thom's elementary catastrophes are the "syllables" of a language; the typical catastrophes of Nature are "words" in this language.) This is strictly analogous to what happens in particle physics, but it is a radical departure from the usual approach to discontinuities, which involves a whole host of special methods for special cases. Some of these methods are very well developed within particular fields, but they lack the breadth that, at least potentially, the new theory has. It is this prospect of finding a unified, systematic, and conceptual approach to the problem that so fascinates proponents of the theory. However, the only sensible way to test the ideas is to try them and see whether they work.

Initial efforts to do this amounted to a rapid "scan" through possible areas to locate those that seemed most promising. They ranged from "hard" physics (optics, fluid dynamics, acoustics) through biology to the "soft" sciences (sociology, psychology). At some point in this process, catastrophe theory became public property. Of course, it lost a little on the technical side: one lady, who had been studying the sufferings of cancer patients, and concluded (probably correctly) that they felt an impending sense of doom, wrote that having heard of Thom's work she now realized that they suffered an impending sense of *catastrophe*. I don't think she really grasped the details of the subject. The upshot of all this publicity was to polarize opinion, with some people being vio-

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lently in favor of catastrophe theory and some violently against, while neither side had much idea what the theory actually consisted of.

The problem is that the "applications" most immediately accessible to a general audience tend to concentrate around the more speculative efforts at the "soft" end of the subject; and simple illustrations of possible lines of attack in these areas may be misinterpreted as definitive examples of the theory in action.

A favorite example, still widely misunderstood in this way, is Zeeman's "dog" model [9]. Konrad Lorenz, in his book *On Aggression*, noted that, while the aggressive behavior of a dog which is just frightened or just angry is easy to predict (it will, respectively, flee or attack), a dog which is *both* frightened and angry may do either, unpredictably. To a catastrophe adept, this "bimodal" behavior instantly suggests a cusp catastrophe, and Zeeman developed from this a model of dog behavior shown in figure 1. The folded surface here is the famous *cusp catastrophe* surface, and here gives a kind of three-dimensional graph of the dog's behavior (measured on a vertical scale with attack at the top, withdraw at the bottom) against the combined values of rage and fear. This model—which I shall not discuss in much detail, since it is all in [9]—suggests a resolution of the unpredictability. The idea is that the dog's behavior depends on its past history, in the following sense: two different paths through rage-fear space, starting and ending at

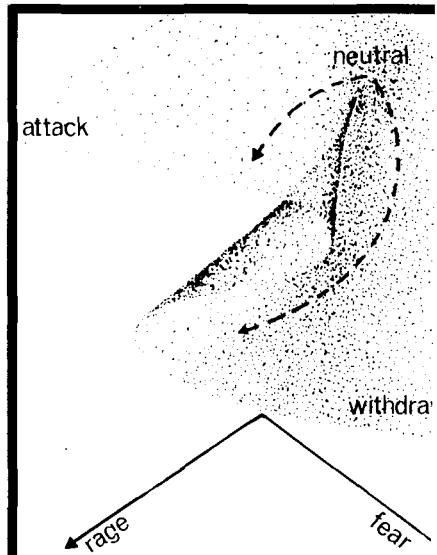

FIGURE 1
The cusp geometry that shows a dog's behavior.

the same points, can lead to different end-points on the surface above (as do the two dotted paths). Roughly, if the dog becomes frightened before it gets angry, it will withdraw; if the other way round, it will attack.

This is certainly an interesting idea, and it appears to incorporate a number of features of dog behavior, such as *sudden* jumps from attack to retreat, or vice versa, in a satisfying "overall" way. However, closer analysis of what it says makes it clear that *testing* the model is extremely difficult, and therefore that its status will be hard to resolve. For example, one critic interprets the use of a continuous scale from withdraw to attack as implying

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that the dog may "attack gradually", rightly remarking that this is a nonsensical idea. Unfortunately, he can't have read the original paper very closely, because Zeeman states quite clearly that the behavior variable is not what the dog is *doing*, but its emotional state. A state of mind moving gradually toward an attacking posture is not at all nonsensical. But it's even harder to measure a dog's state of mind than what it is doing, so while this refinement of the model avoids theoretical problems in setting things up to start with, it doesn't lend itself to experiment.

Models like the dog have been proposed, *not* to prove how wonderfully successful catastrophe theory is in behavioral matters, but to illustrate the new ways of thinking that it opens up. It should be clear enough that until some of these models can be properly assessed, the applicability of the theory to behavior must remain conjectural. The widespread confusion over what catastrophe theory is, what it says, and how much of this actually achieves anything, seems to have arisen because too few people are prepared to wait and see how it develops.

Chances of stemming this rising tide of confusion are probably comparable to those of King Canute, but while waiting for the ebb it is possible to achieve a reasonably sane and balanced view of both the aims of the theory and its potential, by concentrating on the physical sciences. Here catastrophe theory already has some indisputable successes to its credit; further, the experience of successful applications permits a clearer view of the directions in which to proceed. The hope is that catastrophe theory will provide a routine and accurate method for analyzing certain types of discontinuity, called *singularities*, that arise in mathematical models of the real world. The process should usually take the form of recognizing an elementary catastrophe singularity by observing some of its characteristic features (analytical or geometric), performing a *quantitative* analysis on this basis, and testing the results experimentally. Tim Poston (Battelle, Geneva) and I have just written a book [2] explaining how this can be and has been done, and it should be consulted for the full technical details and necessary qualifying remarks. Here is a good example of the method in action.

Modern "plastics" are made up of long-chain polymer molecules. In many technological uses of polymers these occur in liquid form, either as molten polymer or in solution, and the flow properties of such liquids must be understood. The way polymer flows is complicated by the tendency of a long-chain molecule to behave like elasticized spaghetti. An undisturbed polymer molecule tends to organize itself as a loosely jumbled thread, but this can be drawn out and "combed" by suitable stresses, such as occur in a fluid. The elastic properties of the molecule react back on the fluid, and it does not even seem possible to write down accurate equations for the mo-

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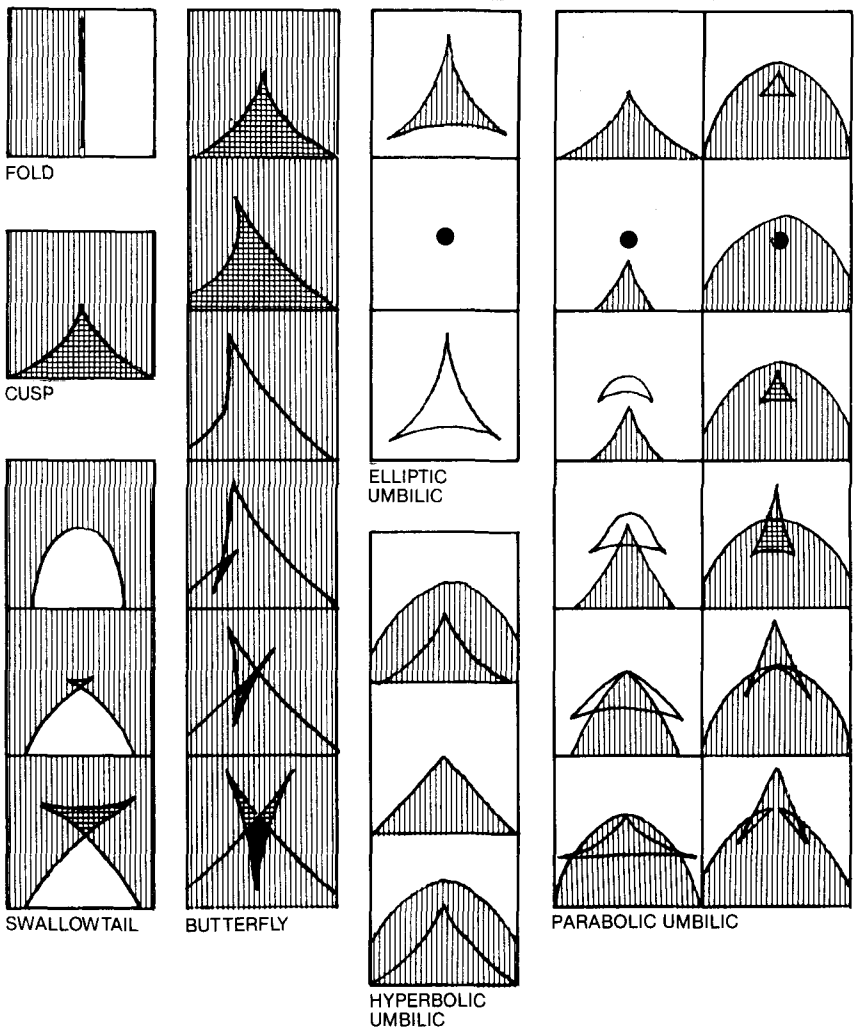

FIGURE 2
Flow patterns in the six-roll mill exhibit drastic sensitivity to roller speeds.

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tion, let alone to solve them. Nevertheless there are useful properties of the flows that it would be nice to understand. For example, by dissolving polymer in oil it may be made to flow along a pipeline some twenty percent faster, thus reducing pipeline costs.

Michael Berry and Malcolm Mackley [3] have analyzed one particular set of flows using catastrophe theory, and they find in particular that changes in the flow-pattern can be used to provide numerical measures of the "springiness" of the aforementioned spaghetti, which is an essential step in any problem of polymer flow. Their apparatus consists of six counter-rotating rollers—the *six-roll mill*. If the rollers all run at the same speed then theoretically the flow-pattern is figure 2a. (This is deduced not from the equations for fluid flow—I've just said that those are hardly possible even to set up—but by a "typicality" argument à la catastrophe theory taking account of the sixfold symmetry.) However, theory also predicts that this pattern will be drastically sensitive to slight changes in the roller-speeds: for example figure 2b may be expected to occur. The "unfolding rules" of catastrophe theory (explained in [2] and [4] in simple terms) predict that there will be exactly 63 different types of pattern (a number which reduces under symmetry considerations to 10), and that changes from one pattern to another can occur only in certain specified ways. They are governed by the roller speeds and the quantity of polymer in solution, according to a mathematical surface (figure 3) associated with Thom's *elliptic umbilic* catastrophe. This surface divides the mathematical space whose axes are roller-speeds and polymer concentration into 63 pieces: 18 three-dimensional regions between sections of the surface, 30 pieces of surface, 14 lines where these meet, and a single point in the middle. To each corresponds a type of flow (shown in cross-section in figure 4 for one end of the picture; passing to the other ends just reverses direction), and changes in the pattern correspond to moves from one region to an adjacent one. Thus the diagram not only classifies the flows, but explains how they vary as the speeds and concentration alter.

Berry and Mackley [3] have obtained extensive experimental evidence verifying these results (some of it is reproduced in [2]). While the mathematics may seem fairly traditional, it is in essence purely Thomist, and it is doubtful that the idea would have been thought of without the catastrophe theory viewpoint. In particular, the hope of controlling *all possible* nearby flow patterns by just varying three speeds would hardly have arisen. Further, there is the practical payoff of using the speeds at which changes in pattern occur to read off numerical properties of the polymer.

Before giving other examples, let me say a little about the general mathematical set-up envisaged by Thom, which (*very* roughly) is as follows.

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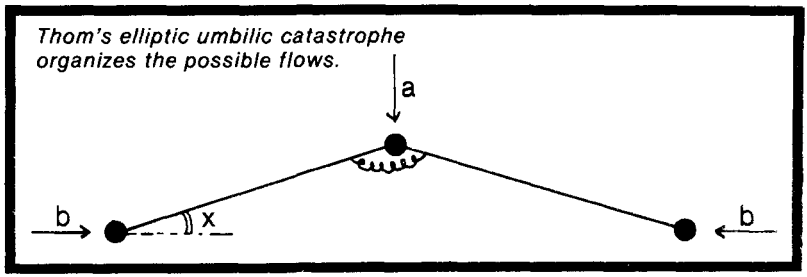

FIGURE 3

Consider a system whose behavior may be described by a number of variables, subject to the control of several other variables. (Thus the polymer flow, described by the shape of the lines and the position of the various features, is controlled by the roller speeds and the polymer concentration.) Given such a system we must select, from the infinite range of possible types of behavior, exactly one. Mathematically this is done by imposing a *dynamic*, specifying how the system may evolve from an initial state. It will eventually settle down to an *attractor* of the dynamic, approaching more and more closely a "steady" behavior (which may be a periodic oscillation, a fixed state, or a "random" motion through a restricted class of states). The catastrophe problem is to describe how the attractors change when the controls are varied, with emphasis on sudden changes in the type or number of the attractors.

This is not a new problem: partial

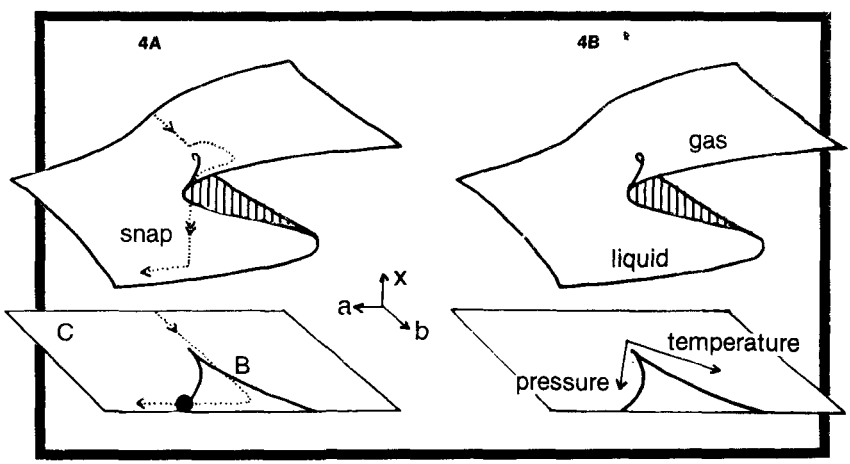

FIGURE 4 *The full range of patterns.*

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answers are known in many special cases. It is much too hard to solve completely, and to obtain any reasonable grip one must impose other conditions. A very fruitful one, which goes back to 1937, is *structural stability:* roughly, this requires the description to be insensitive to small changes in the system. The rationale is that small perturbations of this type are unavoidable in nature, yet physical experiments give repeatable results. In a sense, what we are saying is that "Nature chooses simple systems," with a new and rather precise meaning for "simple" (see Poston [10].)

Thom's classification of elementary catastrophes arises most directly (but *not* only) from this setting when the system is of *gradient* type: it evolves by minimizing a quantity similar to energy. I will not list the formulae here (see [1,2,4,5,9,11] if you want to know); but I will point out the restrictions on its validity. Thom's list of seven applies only to systems with 4 controls or fewer (though Vladimir Arnol'd has extended it to 14 controls); it applies only sufficiently close to a given point; it is topological, and permits smooth changes in the variables; and it is *generic* or *typical:* it does not describe certain "infinitely rare" exceptional cases which, nevertheless, *may* occur (and under special conditions, like symmetry, *must*). This makes it a delicate tool to use—or rather, would make it, were it not for a fact which opponents of the theory have utterly failed to comprehend. *Applications of the* theory *do not proceed by applying the* classification.

This is a slightly paradoxical remark, and I would prefer to leave it to simmer for a bit, while reviewing a few more applications. It is, however, one of the essential lessons to be learned from the way applications to physics have worked out, and it carries a moral for all would-be users of catastrophe theory.

A simple illustration of catastrophe theory occurs in engineering, in the buckling of an *Euler strut* (figure 5): an incompressible flexible rod. Starting with the rod nominally horizontal, and applying a compressive force b at the ends, we find that it suddenly starts to buckle, either up or down, as b reaches a critical value (first found by Leonhard Euler in 1744). For definiteness, suppose it buckles upwards, and apply an increasing load a. Then there comes a critical value of a at which the strut suddenly snaps into a downward position. These "dynamic snaps" are important in engineering: usually a structure is deemed to have failed if one occurs.

To use catastrophe theory on the strut we calculate a formula for the energy in the system when, with force b and load a, the angle of the arch is x. For each a and b we find the maxima and minima for x, and plot these values as a many-sheeted graph. The result, figure 6, is once more the cusp catastrophe surface. It is smooth but pleated, and the curve B above which the pleat lies has a sharp tip, or *cusp.* We call B the *bifurcation set:* each

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catastrophe has one, and figure 7 shows representative cross-sections for each of the seven elementary catastrophes.

To see how this surface explains the observed behavior, consider the dotted path C giving the gradual changes of controls: first increase b, then leave b fixed and increase a. The dotted path above C on the surface shows the changes in position of the arch: first buckling upwards, then snapping downwards as the curve "falls over the edge." The same picture applies to *any* sequence of changes in loads and forces that we care to specify.

So far none of this surprises engineers, though figure 6 actually only goes back to about 1960. So what *is* new?

For this example, not much: it would be a surprise if there were, because it's so well understood already. But even here there is a new point of view, which emerges only if you do the calculations. It is sufficient to compute the energy at just one point: the tip of the cusp B. It is of the form

$$x^4 + \text{higher order terms.}$$

This fact alone implies that around the point in question, the surface must have essentially the shape shown. By finding the term in x^5, and the effect of loads to 1st order in a and b, 2nd in x, we can even deduce the direction in which the cusp points. The theory, admittedly, does not tell us how near to the cusp tip we must go to get a good approximation numerically; but experimentally it turns out that the picture holds good over a fairly large range of values.

The really new thing is that the whole mathematical package can be made to work, in exactly the same sort of way, and with the same simplifications, for a whole series of different buckling problems. As a bonus it will tell us whether our analysis has included enough variables to be truly representative of what will happen. For example, in the buckling strut, if we assume that load a = 0 we will not find any snaps: therefore b alone gives an incomplete picture. On the other hand *extra* variables beyond a and b, if small, cannot change the picture in any essential way. This is the requirement of structural stability coming into play.

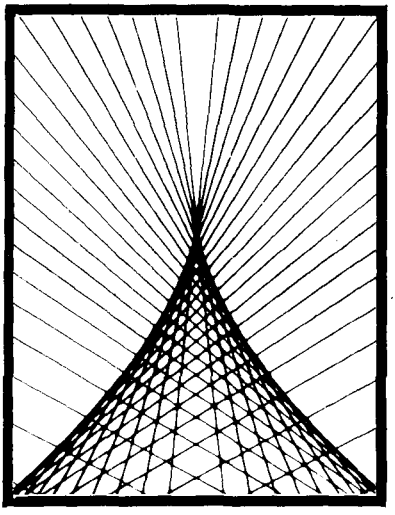

FIGURE 5 *An Euler strut.*

The catastrophe theory methods are especially valuable when looking at

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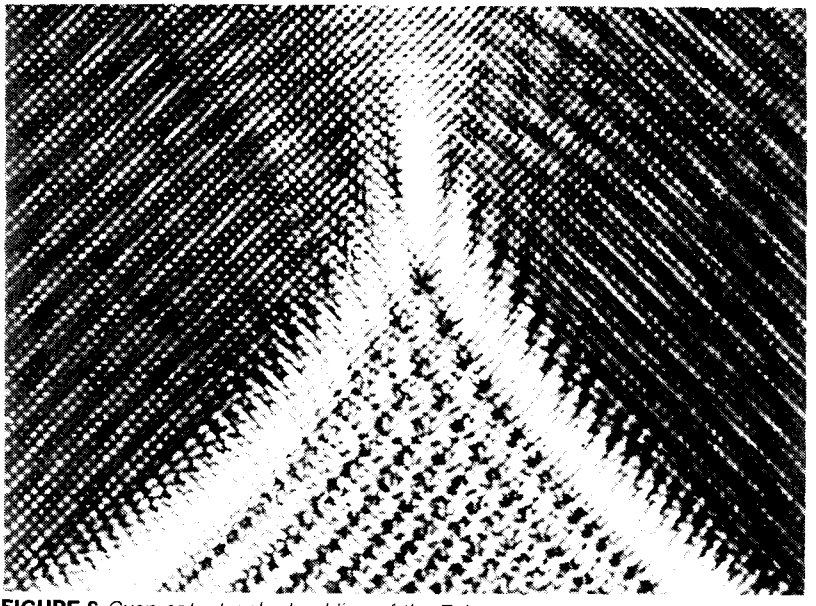

FIGURE 6 *Cusp catastrophe buckling of the Euler strut.*

buckling problems with large numbers of variables. Often these lead to singularities beyond Thom's seven—*but the same techniques apply*. They can further be linked rigorously to the traditional approach to the problem, known as "bifurcation theory," to the mutual benefit of both. For example, some recent work of Robert Magnus and Tim Poston [12] on buckling plates *starts* with the usual "von Kármán equations" of elasticity theory, *proceeds* by a rigorous reduction to the double cusp catastrophe, and *ends* by making predictions that can be tested quantitatively. Some of these, such as the greater prevalence of "mode-jumping" in *careful* experiments, are surprising; but here is not the place to

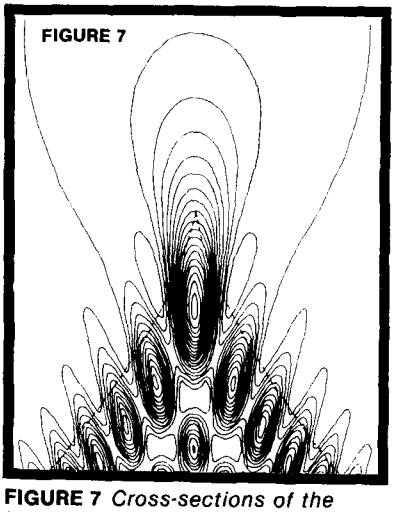

FIGURE 7 *Cross-sections of the bifurcation sets of the seven elementary catastrophes.*

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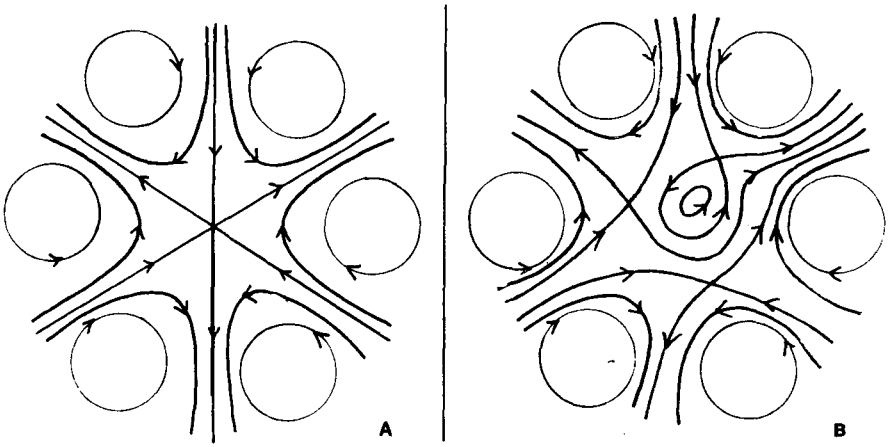

FIGURE 8 *Cusped caustic as an envelope of rays.*

go into 10-dimensional technicalities.

Another area of current interest is optics, in particular the theory of *caustics*. The most familiar caustic is the rainbow, but a simpler one to obtain experimentally is the bright cusped curve that appears on the surface of a cup of coffee on a sunny day.

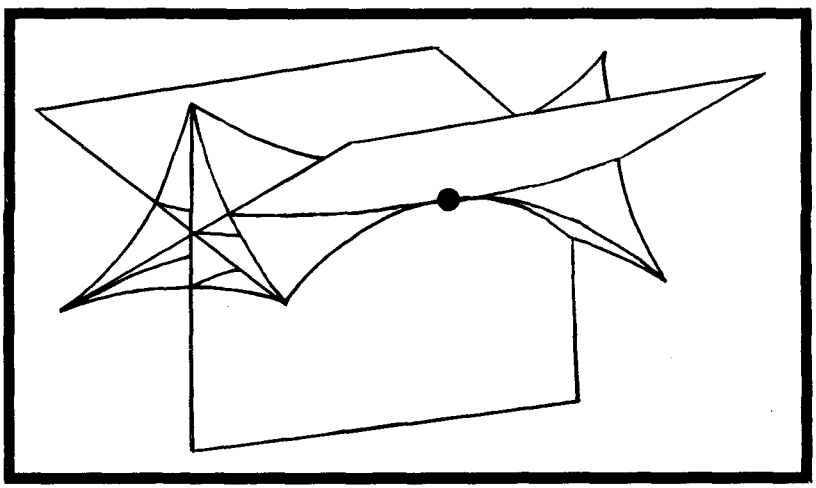

FIGURE 9 *The rays form a cusp catastrophe surface.*

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(Try it if you haven't seen it: an electric light will do, and a saucepan can be used instead of a cup.) The explanation of this, which goes back to 1857, is that the way the light rays reflect off the cup gives rise to a cusped *envelope* which they all touch (figure 8). The connection with catastrophes? Actually, figure 8 is taken from [5] and is a cusp catastrophe surface, viewed from above, with the rays ruled on it as in figure 9. This is not just a trick: each caustic corresponds to a catastrophe whose "energy" is related to the optical pathlength, and catastrophe theory therefore classifies the "typical" caustics of nature.

A particularly "Thomist" example of this is the work of Berry and Nye [6] on the patterns seen on the bottom of swimming pools. These are caustics, and they habitually form triple junctions, like cracks in mud. So striking is this resemblance that it has been assumed that the same stability property of triple junctions is acting in both cases. However, Thom's list contains no triple junctions! According to catastrophe theory, the worst we should see is a mixture of fold lines and cusp points, with elliptic umbilics and swallowtails at particular levels. Berry and Nye show that when observed through a microscope the triple junctions have a fine structure, composed entirely of fold lines and cusps, "organized" as predicted by the higher catastrophes. With a little more effort it is possible to beef the theory up to a quantitative level: work at Bristol is now giving an excellent match between photographed patterns and computer generated catastrophe ones. The point here is that catastrophe theory tells you what to look for.

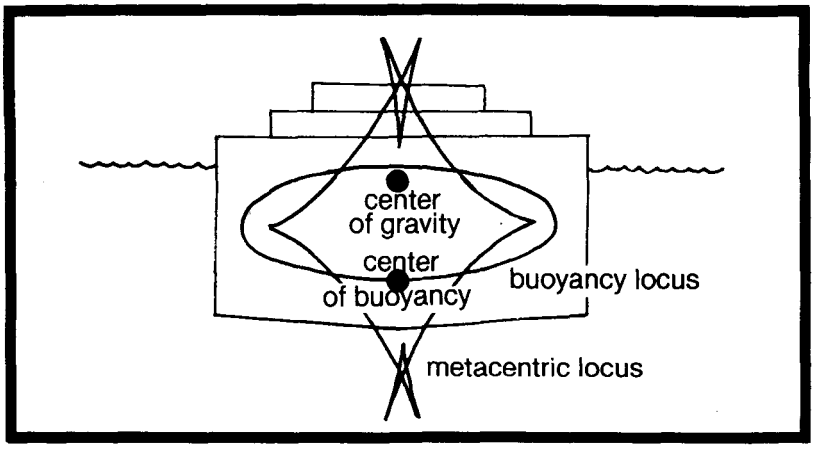

FIGURE 10 *Intensity contours for a cusp caustic (the Pearcey function).*

However, ray optics is somewhat old-fashioned: these days everyone does quantum optics. Catastrophe the-

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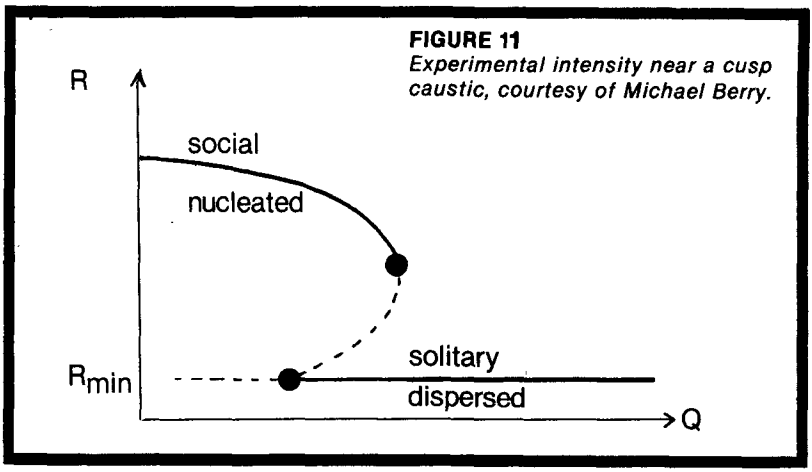

FIGURE 11
Experimental intensity near a cusp caustic, courtesy of Michael Berry.

ory rises splendidly to the occasion, by providing a mathematical transform between ray optics and "semiclassical" quantum theory. (The actual transform arises from the work of physicists, notably Maslov; but the general setting is catastrophe theory beyond any shadow of doubt.) For example, transforming the cusp catastrophe leads to figure 10, whose contours coincide very closely with the pattern of light intensity observed near a cusp caustic shown in figure 11. This is not the only occasion where the reformulation of a classical theory in catastrophe language permits it to be linked directly with more modern theories of the same phenomena, and the result is usually illuminating.

These methods have been used very effectively by Berry and others on many optical problems: scattering of light by droplets, scattering of atoms off crystal surfaces, propagation of acoustic waves . . . A recent application by Berry is to the twinkling of starlight. Stars twinkle because random fluctuations in the atmosphere impose caustics on the light emitted. Variations in intensity can be measured by "critical exponents" which tell how fast the averaged powers of the intensity tend to infinity as the wavelength tends to zero. According to Berry, for starlight these critical exponents form the sequence

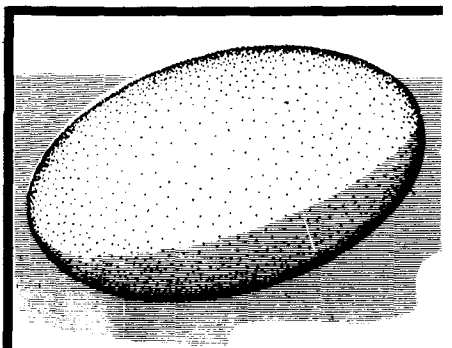

FIGURE 12 *A floating ellipsoid.*

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$$0, \frac{1}{3}, 1, \frac{5}{3}, \frac{5}{2}, \frac{7}{2}, \frac{9}{2}, \frac{11}{2}, \frac{13}{2}, \frac{38}{5}, \frac{87}{10}, \frac{157}{16}, \cdots$$

Experiments to test this prediction are under way. Far from being "purely qualitative", as some critics fondly imagine, catastrophe theory can be extremely quantitative!

As a final example of the quantitative uses of catastrophe theory, consider the problem of ship stability. Ignoring wind and waves (hardly realistic, but the usual starting point in the subject) we find an exact parallel with catastrophe theory, with the "energy" of a floating ship being . . . energy. Imagine a ship floating as in figure 10. The geometric controid of the part of it below the waterline is the *center of buoyancy,* and is the point at which the upward force due to the water acts. Downward forces—the weight of the ship plus cargo—may be thought of as concentrated at the *center of gravity* of the ship. If we now vary the angle at which the ship sits, the center of buoyancy describes a curve, the *buoyancy locus,* and the "center of curvature" of this is another curve, the *metacentric locus.* This is actually the bifurcation set of the associated catastrophe, and sudden jumps occur when the ship capsizes. The advantages of the catastrophe formulation (due to Christopher Zeeman [7]) are the availability of routine methods for finding the nature of the metacentric locus, and the detailed interpretation of the resulting geometry. The method applies equally well to three dimensions: one of the *simplest* cases is an ellipsoid (figure 12) for which the metacentric locus is the distressingly complicated shape of figure 13. Further, the static theory is now compatible with a dynamic analysis.

I hope that the examples above (supported by the full story as given in [2]) have succeeded in making what I feel is the essential point about catastrophe theory as applied to physics, namely: it is a mathematical tool capable of the same precision as the usual

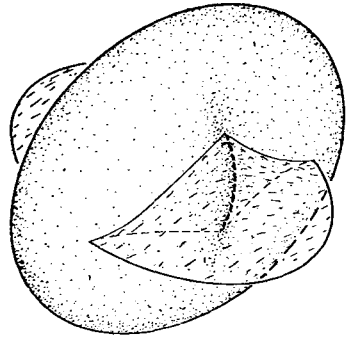

FIGURE 13
Metacentric locus for the ellipsoid.

methods of mathematical physics, making quantitative predictions testable by experiment. Some scientists have, quite reasonably, been worried by the topological aspects of the subject, which they identify as "qualitative" (thus damning it with Rutherford's slogan "qualitative is just poor quantitative" which actually begs the issue here), imagining that the idea is to try to do science "on the cheap" without learning any. Nothing could

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be farther from the truth. The way to apply catastrophe theory in the physical sciences is to start from currently accepted theories, using the new techniques to *develop* new aspects of them.

This is a good point at which to return to the item that I left to simmer earlier. These techniques go far beyond mere *classification*. They allow us to *compute* correctly the structure of a given singularity when it arises in a mathematically oriented science. The methods by which the classification is obtained (sketched in simplified language in [2] and [4]) are of considerably greater importance than the bare result. However, the classification has its own role to play, as an organizing influence. The periodic table of the elements is seldom applied *directly* in chemistry, yet it is fundamental to the whole approach used in the subject. It is the same with the table of catastrophe "elements."

The moral is that—contrary to statements sometimes made by catastrophe theory enthusiasts—it is *not* possible to *usefully* apply the classification theorem without understanding at least the spirit of the mathematics behind it. It is no more feasible to do mathematics on the cheap than it is science.

When we cast off from such solid shores into the murky and turbulent waters of catastrophe modeling in the "soft" sciences, these examples in physics shed some welcome light on what the true difficulties are. But before we do this, it is instructive to perform a small statistical analysis of the catastrophe theory literature. Excluding popularizations, published articles since the appearance of Thom's book [1] follow approximately the pattern below:

("Social sciences" here include economics, sociology, psychology, linguistics, geography, and archaeology.)

This should demonstrate that the status of catastrophe theory cannot be decided merely by studying the "soft" applications. But since these have been front runners in media publicity, let me discuss them briefly.

There are at least two ways of using catastrophe theory in the soft sciences. The first is to mimic as closely as possible the procedure applied almost universally in physics: set up reasonable hypotheses for the problem, and *deduce* a catastrophe. The second

	1972	1973	1974	1975	1976
Mathematics	17	13	28	31	42
Physical sciences	7	6	10	19	23
Biological sciences	5	1	13	4	5
Social sciences	0	6	3	5	9

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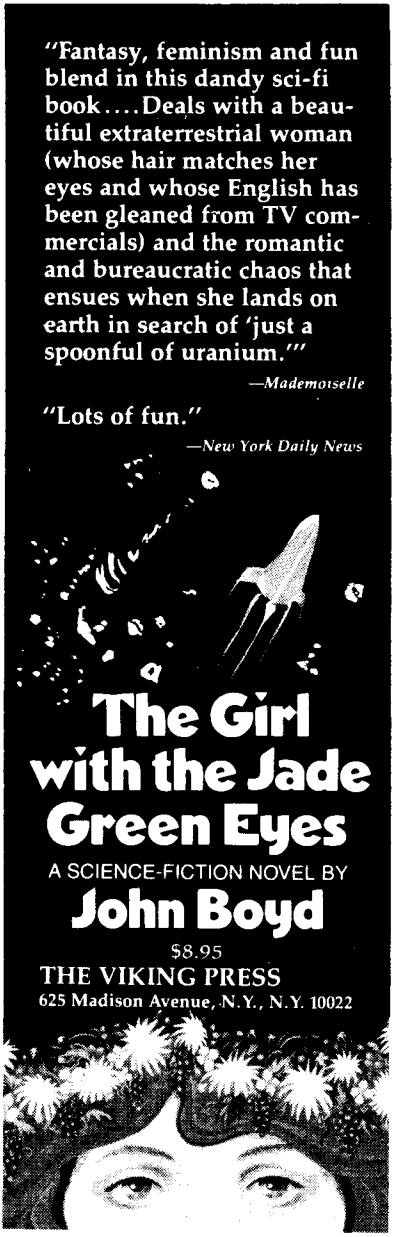
(where all the trouble arises) is to *hypothesize* a catastrophe to begin with, preferably supported by plausibility arguments showing that at least some of the required features are present and how they suggest which catastrophe to use.

I will give a brief example of each procedure. The first, of "deductive" type, is due to Renfrew & Poston [8], and concerns the pattern of population in agricultural areas. Both ancient and modern settlement patterns show a wide variation between populations which are *dispersed* in scattered farmhouses, or *nucleated* into towns. Sudden changes from one type to the other, found in the archaeological record, are generally assumed by archaeologists to be strong evidence (in the absence of signs of natural disaster) for invasion from elsewhere.

They are not.

A simple economic model of the division of labor in such agricultural populations leads directly to a geometry (with a fold and "constraint catastrophe" not on Thom's list, for technical reasons, but of the same general nature and handled by the same methods) in which sudden jumps from dispersal to nucleation, or back, arise purely from maximizing economic advantage in a smoothly changing situation. Once we have found a mechanism like this *without* invaders, then the evidence for invasion collapses unless it depends on more than just a sudden change.

The jumps do not arise from the simplicity of the economics: if you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make that more complicated, then what you get is more complicated jumps. The force of the argument is undiminished.

For the kind of model that jumps in with both feet, I am going to use a slight modification of a diagram that appeared on the blackboard after a catastrophe theory lecture. Let me make it clear that this is intended as an *illustration* of the style of modeling, and that I am not putting it forward as a serious model. It is addressed to the following question: why do the pro- and op-ponents of catastrophe theory behave in the way that they do? One notable feature is that they can disagree completely on exactly the same point: this is a two-valued situation occurring most simply in a cusp catastrophe. We therefore take opinion of the theory's worth as behavior variable, and use two control variables:

(a) The degree of solidity of the application concerned,

(b) The degree of skepticism of the person concerned.

Suppose everything is arranged as in figure 14.

The model is interpreted as follows. When the theory is on solid ground, one's reaction is mildly affected by the degree of skepticism, the differences are slight. At the more speculative end of the subject, the adherent becomes more wildly enthusiastic, the skeptic more and more critical; further there is a considerable range over which both forms of behavior are accessible. But the middle ground of neutrality is now inaccessible—opinions have *polarized*. It now requires a critic, sitting on the lower surface, to move a considerable way toward a favorable view before he will make the transition to enthusiasm; and when he does so it will be with a sudden jump ("conversion") from fairly severe criticism to wild enthusiasm. Likewise the enthusiast will have to move a long way toward skepticism before he suddenly jumps to a critical posture ("disillusion").

The reader is invited to explore other features of this surface. For example, what is the difference between someone who starts mildly favorable to the theory and then moves to more speculative parts, and one who starts mildly skeptical and moves the same way? A certain amount of experimentation will show that this is not entirely unreasonable as a model—albeit a crude one.

The real problem comes when we ask: is the model right? It would be extremely hard to decide, because it is simply not formulated in terms accessible to experiment. How do you measure the variables? Are they the right ones? How do you know other variables won't get in the way, and if so, how do you exclude them? And so on. In the absence of experiments, discussion of such models tends to degenerate rapidly into ideological squabbles, often dragging in the whole philosophy of mathematical modeling: hence the utter confusion in the literature between criticisms of catastrophe theory, criticisms of mathematics, and criticisms of conservative/

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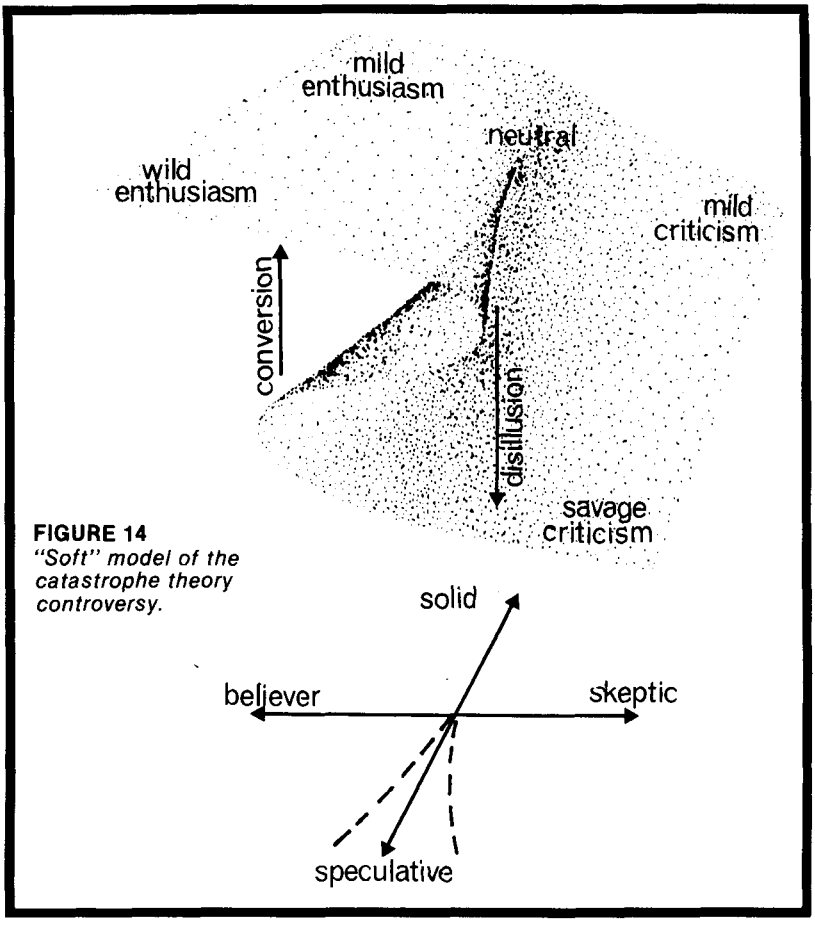

FIGURE 14
"Soft" model of the catastrophe theory controversy.

liberal/radical ideology as exemplified by the choice of model. The first step toward understanding these problems is to disentangle these strands of argument, but the present debate seems to be aimed more at confusing them.

It is clear that whatever the status of these models is, they are at best "geometric metaphors" for something deeper. There are also of a radically different nature from applications in the more numerical sciences. The critical wolves who bare their teeth solely at this most speculative end of catastrophe theory are, for all their huffing and puffing, blowing down only houses of straw. But the little pigs of catastrophe theory can build brick houses too.

I don't wish to sound too scathing

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about the "soft" models. Despite their faults (real or imagined) and the difficulty of doing experiments, they represent a genuine attempt to come to terms with the awkward "nonlinear" problems of sudden jumps, multiple equilibria, and other phenomena so prevalent in the real world and so absent from social theorizing. Their greatest problem is best summed up in geometric metaphorical terms, using figure 14: at the speculative end, the enthusiast and the skeptic have no common ground for debate. Like the two housewives who could never agree, they were arguing from different premises: more seriously, they are adopting different *paradigms*, and see the world through different spectacles.

Until this difference can be resolved (catastrophists will immediately think of the butterfly catastrophe which introduces a new sheet of "neutral" compromise into figure 14, but it is more than my life's worth to propose this here) there is really no point in getting tremendously excited about the matter. The problems are quite difficult enough in physics, where experience in applications has considerably modified the original conception of how to apply the theory—while amply justifying the view that it *could* be applied. It is surely more sensible to explore these directions first, in the hope of getting a better grip. Referring to our opening quotation and figure 14: the best way to grok all is to follow Michael Valentine Smith and balance on the point of the cusp.

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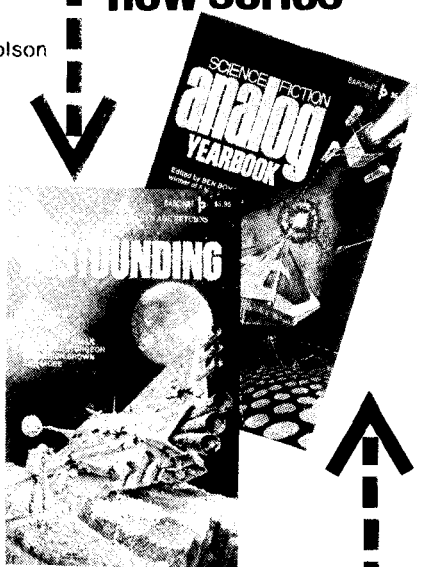

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STAR SWARMER

One purpose of civilization is to shape our lives and give meaning to them. But is there a purpose to life itself?

GREGORY BENFORD

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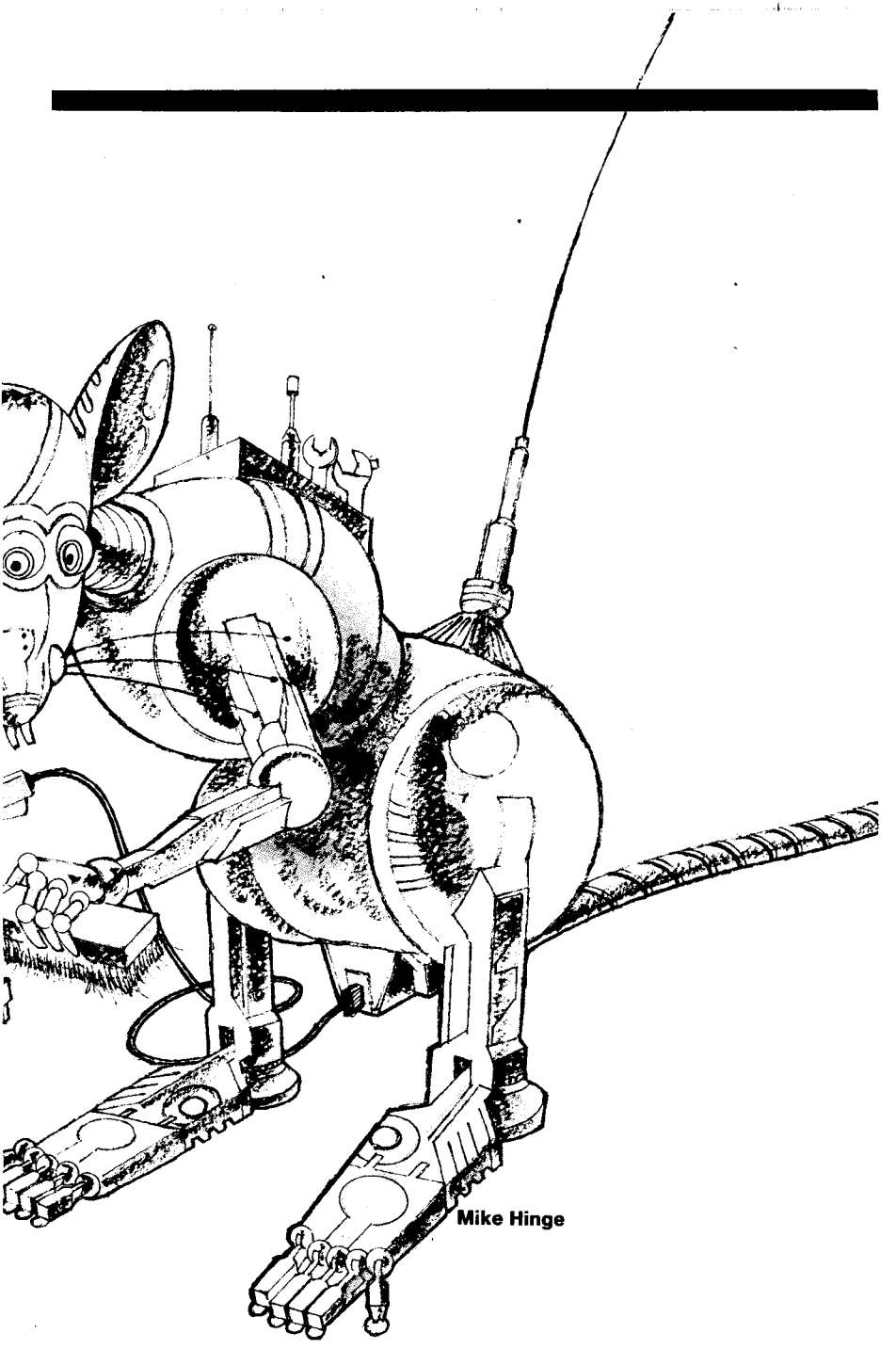

Mike Hinge

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Clinking clacking jittering, Qath strode the slashed land. A final hill loomed between her and the Syphon. Qath articulated widely, legs grating, yawning, and surged over the apex. A stone outcrop shattered on her underbelly and ground away with a brittle shriek. Qath tuned out the wail of tearing metal, even as she felt the alloy rip and a storage vat pop, the sulphuric mix gurgling out. She paid no heed, she peered ahead. There, blooming skyward in orange plumes, would grow the Syphon.

: : Where are you, slit-eye?: : came a burst in Nimfur'thon's sweet-sour tongue.

: : Coming askew you on 97°-42-In8, monopod: : Qath spat in reply, though hissing to take the sting from her jibe.

: : You will stumble, prang yourself, and be late.: :

: : You faxed you would be *heclens* from the Syphon. Yet I read you within the zone of second-order radiance: :

: : So I am: : Nimfur'thon said this with an elaborate, shimmering aura that framed her chuckle.

: : That is too close. The Tukar'ramin specifically *warned*. Interchange modes of the jet can snarl outward: :

: : They are mere statistical fluctuations, low-limper friend. Thermodynamically bounded. Feedback stabilization will catch the bulge and tuck it back in to its mother sac.: :

She stopped to measure her position, using fixes on two nearby peaks. There were no moons circling this world; for easy navigation, they should have put a small artificial one in place. But the podia did not plan on being here long enough to justify the trouble.

Qath surged downhill, clanking jingling ringing, as her pods found footing on the skittering stones. She arrowed on Nimfur'thon's peeping redness. Calmly, letting no color into her warble, she said

: : Still, we were mandated to stay three *heclens* away: :

: : Monopody, you. We said we would come together and watch the plasma dance on the hills. How to see it otherwise?: :

: : I, we have—: :

Qath's mind clogged for an instant as she sensed a servo whine—*eeeeeeii*—in a forepod. She thought of the Tukar'ramin safely working in the Hive, beyond the brimming ridgeline. She and Nimfur'thon should be there, celebrating with the rest of the hive's brood. Instead Nimfur'thon had persuaded her to come here, against the Tukar'ramin's directives. Qath had tramped these hills many days with Nimfur'thon as they labored together. They had struggled with the fluxtube canisters. Nimfur'thon had splintered a pod bone when a bulkhead tipped over. She had been unable to

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walk without agony until Qath, boosting on rockets back to the hive, fetched an artificial replacement. The new pod shaft worked better than the natural organic one, as usual. Qath envied Nimfur'thon the fresh pod, for the other was now faster; she had no natural pods left.

: : Your ossicles overload at this small flight?: : Nimfur'thon sent in sharp chatter. In parallel she lifted a sing-song, *I, we have: I, we have* on a sour sideband of her carrier, taunting.

: : No, I—I—: :

: : *Ground-burrower*, you become. *Cicada*-Qath. Your thorax trumpets, but at the cusp moment—: :

: : Enough cyst-sucker! I am soon to be upon you.: :

With a lurch Qath birthed a rosy egg of flame beneath her and jetted up a granite-flecked cliff face. All through Nimfur'thon's chiding Qath had been planning, vectoring. Now, expending all her maneuvering reserve in one spurt, Qath arced up the stony wall and—fuel guttering out in a black fog, rockets choking down—she scrabbled at the boulders of the peak. Clutched. Teetered on the brink. Fanned the blue air, and caught. —*jitjitjit-eeeee*—screamed a linkage, but Qath scrambled to safety, feeling the warmth as her center of gravity slid into snug position above solid ground.

: : Take homage here!: : Qath barked as she sighted Nimfur'thon's squat disk on the plain below.

: : How did you—? Ah, squeezed out your last dollop of fuel. Not wise.: :

: : *You* bray of wisdom? *You*, who jibed me into ambling here?: : Qath felt suddenly exposed on this high point. She spied sheets of phosphorescence hanging in the air—near, chillingly near.

: : You have the best view.: : Nimfur'thon temporized, her rippling signal now betraying a thin thread of doubt.

: : The Syphon forms,: : Qath said. Yellow steam gouted from a jumble of hills. Mudworked buildings crescented the ridgeline, temporary housings for the fluxtube formers. : :It's coming. I think we should—: :

: : Yes, go down the reverse slope, Qath, away from the Syphon.: :

Qath scrambled downslope, sending boulders clattering with her bumpers. : :And you? We must hurry.: :

: : I will cross this plain. We meet in that low rut, there—: : Nimfur'thon squirted a vectored grid-image : :—and watch the Syphon.: :

Qath could hear her heaving grunt as she geared up in haste.

: : We *deserve* a good gaze at it. This is our first, not like a vinegar-souled multipodder who's bored with it. And we have labored hard for these moments.: :

Qath ignored these repeated justifi-

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cations and focused on the skittering gang of rocks that herded before her, racing and leaping downhill. No moment to be buried in the embrace of pebbles, no. She skirted a ledge, made a controlled slide—

: : Qath—there are animals here!: :

: : Impossible. The area was burnt fine. Run, you—: :

: : No, I have stirred them out with my pounding. They swarm from their pits.: :

Qath turned and crosshaired Nimfur'thon on the plain. Dots jiggled about the gray-white disk. : :Flyers. Birds.: :

: : No, *hoppers*. They are the worst. Pests, into everything.: : The disk that was Nimfur'thon lapped flame at the dots and they blackened, tumbled.

: : Move on! We have mere moments!: :

: : No. I sense there are more here. What if they have gotten to the fluxtube formers? They could spoil the Syphon.: :

: : Run.: : She ceased looking and lurched at full gear down a narrow ravine.

: : I can pick up their thrummings now,: : Nimfur'thon cried. : : There are many here. They stretch in long lines.: :

: : Seeking food. Grazers. But you must leave that exposed plain. *Now*.: : Chuffing, clenching, she jounced down the steep cleft.

: : We must call upon the Tukar'ramin. These pests could be in the fluxworks—: :

: : Then they shall soon be scoured *out*. Witless, we *cannot* call the Tukar'ramin. Forgotten, have you, that we are here without mandate?: :

: : Yes, *there*, I have flamed the last. There be more—: :

: : Forget them: :

: : You are right. I come.: :

The sky crinkled.

: : *Fly*! Time does not allow—: :

: : I am. I am firing—: :

The sky shattered.

Qath slid to a stop, tucked in pods, *snicked* ports and shields fast. The air sang an ionized blue. From the low hills lanced up the fluxtube, ripening pink to red to orange. Wind howled and clutched at Qath's rim, thin fingers to tip her over. Qath tuned frantically to the brood's channel, to call out, and instead was flooded by the brood's view, from the far ridgeline.

The fluxtube grew straight and true from the skirt of hills, biting the ceiling of clouds, boiling them away in a purple flash. It climbed up, up, in an instant had cleared the ivory clouds with its heat. Now the black of vacuum appeared, a spot forming high up, a target coming into being as the arrow shot through it. Stars winked new.

Now the upper link was forged. The tube opened on the clean vacuum of space. They had watched it climb, eyes smarting, awed at it. The brood sent forth a chorus of applause, a popping and frizzing song.

Complete came the Tukar'ramin's warm signal. Now the fluxtube hummed with new life.

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It was a transparent string of electromagnetic fields, hollow at the center. The intense fields exerted pressure as the tube thrust down, deep into the rock of this world. The tube walls kept back the pressing rock on all sides while the tip probed deeper. Vast stresses fought along the tube walls. The tip gnawed, burning a cylinder of stone free of its mother world. The top of the tube was in the vacuum above, while immense pressures pushed the freed rock upward from below.

Complete the mellow, unhurried voice of the Tukar'ramin came—and the fluxtube suddenly filled.

Its pearly, transparent walls of force turned mottled gray. A plug of rock was streaming out.

Qath called : : *Nimfur'thon*: : in the roaring, pelting gale. The wind's pebbled teeth clattered on her skin. : :*Nimfur'thon*!: :

: : Here. I landed, but am exposed.: :

: : *Hold*.: :

: : Blinded, we are, my monopoddy. This grimy breeze—: :

A rolling blast burst over the hills. The fluxtube brightened. The cylinder filled, pink to red to white.

: : *The core*—: : and out it spurted. The lance had struck to the center of this world, to its treasure. The fluxtube had flared out as it bared downward, to surround the ball of molten nickel-iron at the core. The tube throat was artfully shaped like a rocket chamber, fat at the planet's center, then narrowing as the white-hot metal funneled up from the core, increasing the thrust. The nozzle connected the vast core pressure to the void of space. The riches squirted up and out, fleeing the groaning weight of this world.

Qath squinted. The fluxtube walls glowed. Liquid metal shot through it, blindly rushing toward the stars. She was totally caught up in the transmissions flooding her. The Tukar'ramin's view of the tube shimmered.

Delicate streamers of green and amber danced amid the white fires. Precious metal fluids—the only horde this wretched, moonless planet boasted. The tube sucked this life out, up, through the air and above the blanket of gas. The view tilted, following a black fleck of impurity up the thin glowing line. Starwards. Through the black disc, into sucking void. The fluxtube curved away, high and beyond air's clutching. There, at the rim of the dark hole, a wire cast in space. The tube peeled over until it found an orbit for its pap, and then released the boiling metal. The yellowing, shuddering fluid, free of gravity's strangle, shot out into the chill. Returned to the spaces it once knew, the metal cold-formed, mottled, crusted its skin with impurities. The birthing thread creaked and groaned in places as it unspooled. It fractured in spots, yet kept smoothly gliding along its gentle orbit. Cooling, it grayed. Graying, the threads would make the frame for their work here.

: : Qath! Something—: :

Qath, dazed, fixed on Nimfur'thon. But the signal faded. She sent a burst to the hive through a haze of noise. An

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answering tone came, and the brood view at once tilted back down the glowing string of metal, to the hills. A hurricane wind had flushed clear the air. The eerie light of the core metal dappled the plain with shadows. But something wavered—

The tube. It twisted, hummed, curled into a helix, straightened again. Light surged in the walls. A bulge formed. It grew. Qath watched the image, awash in it. The fattening fluxtube rippled. Flexed. And looped suddenly, faster than eye could follow. Out, across the plain. The metal soup escaped. A blinding white ball spilled over, splintering rocks, spreading. The gray pancake of Nimfur'thon, crouched in a shallow draw, was singed where the bubbling liquid first touched. The tide hesitated and then lapped over, blackening, blackening, blackening everything.

: : Nimfur'thon!: :

The burnished shape did not answer.

The legs jerking. A ripping scream. Footpads melting where they touched bubbling white. Nimfur'thon turning, pods splintering. Skin popping open. Guts pouring out to flame into brown smoke.

Nimfur'thon's walking pods melted slowly into the ooze, her manipulating pods clutching frantically at the sky, as if to pull herself up. Orange plumes cracked the upper bulkhead. Armpods beat at the flames in spasms. Yellow tongues ate. The bulkhead blew open. Gobbets spattered.

This was the way Qath would remember Nimfur'thon. This vision seared away all other memories. For what seemed a long time Qath could see nothing but this licking moment of death. Her opticals registered other inputs, but her mind rejected them. She stood frozen. Silent. She began to tremble.

The Syphon guttered out. The helical instability was diagnosed and work parties crossed the plain toward the fluxworks. They carried Nimfur'thon's remains, sectioned, back to the hive. Few spoke to Qath, not because they considered her shamed—inspection of Nimfur'thon's tracer log showed her to be the instigator; the risk was her own—but rather because they were busy restoring the fluxtube projectors, which had fused to slag. As the teams worked, Qath sloughed back to the hive. Her joints and seams ached from pinpricks of damage. Dani'vver, assistant in training to the Tukar'ramin, sent beeping questions during Qath's march, asking details of how the two had maneuvered so close, and—from supple dartings of phrases—sensed the cloud that now descended over Qath.

There followed a rest period, which Qath embraced, even though she felt in the warren walls the strumming of motion from the multipodia, who did not rest. The looping instability was a setback, throwing off their schedule. Overhead, hundreds of their fellow strandsharers orbited, awaiting the

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gouts of metal to begin their weave. The pace in the hive must quicken, then; Qath knew this. Yet she fell into slumber gratefully, legs folded close and tight in the slick webbing; for something pursued her.

Qath woke panting, pods tangled, the speckling of her tracheae bulging red, yellow, red again in fevered rhythm. There was a buzzing call for her that echoed through the groined alcove. Qath answered and found a summons from Dani'vver. She dismounted anxiously. For some reason her mind was a snarled maze. Her hydraulics knotted and filled with a pressing ache. She hastily smeared a vomit-drop on an acrid spore. This eaten, Qath quadded inward, resting one leg which had splintered a knee. She limped through vaults astir with repair work. A pentapod hailed, but otherwise she was ignored. This was nothing new, and in fact was what Qath desired this day. The weight that had descended upon her did not welcome company.

: : You realize you are blameful?: : droned Dani'vver at the entrance to the central chasm.

: : Of necessity.: :

: : Your Ascension will be slowed.: :

: : Yes.: :

: : Addition of a manipulating arm, to render you: :—Dani'vver consulted her slate, rather than look directly at Qath : :—pentapod, will be delayed.: :

: : Yes.: :

: : It is good that you reconcile so easily. Some do not have that ability, though they be multipodia.: :

: : Yes.: :

Dani'vver flicked open a port, studied Qath, and said : : Despite your *ratafelu*, the Tukar'ramin will enter you.: :

Qath felt the spaces within her suddenly open and the fear flood out, squeezing her spiracles shut until the air wheezed through tight slits. She was sure Dani'vver would notice. The wall parted with a soft rumble that hid Qath's rasping breath, and Qath teetered forward on stiffening limbs. She knew she would be seen for what she was.

Terror pins you. The thought came as she gazed up, tilting to register the height. A vast bulk moved in the webs. Moist beads drifted in a tingling cloud. Massive arched stoneworks gave the hushed air a pressing weight.

Qath began, : : Abbess, abysmal sorrow—: :

Do not attempt it. I see.

The looming structure worked with flashes of light, spanning the chasm with silvery swarm. Qath struggled to take it in. She felt a probing. Fine wires laced through the muddy inside of her. She dully sensed a phantasma dancing, spinning—and then gone, evaporated.

It is not Nimfur'thon that infests you. The words rang cold but they floated awash and welcoming in the Tukar'ramin's warm sea.

: : No. I fear some, some—: :

**Cease. The weight you carry

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must be lifted by degrees. Not shrugged aside. Immersion in our Path will help.**

: : I *know* the Path—: :

No myriapod can trace more than a branch or two of the Path, Qath'jutt'kkal'thon. Do not add arrogance to your burden.

: : I—: : The pressing fear welled up again and Qath sucked in breath to cry out.

I see it. Know it. But you must journey through that mossing.

In a pause which renewed her, Qath heard, **The Factotum will show you the Chronicle. Explore it. See the sweep of us. This will restore you.**

Qath left, stumbling on numbed pods, spiracles sucking and bristling in agitation.

Within the Chronicle, time engulfed Qath. Left moored in the mesh by the Factotum, helmeted, pinpricked in all her senses, before her gaze the vast story opened.

She knew the outlines, necessarily. The familiar images flitted by, in ancient incomplete sensoria.

Flat, shrunken multipodia labored every tenth day and rested the other nine. Their life was uncaring, a sweet gambol. Even aged myriapodia lounged amid the sticky strands, pap-gorged, basking slowly. The race spread over the homeworld and then, much later, to a fortunately hospitable neighbor. The sciences were numbed by the pervading slackness.

The podia had not always been this way; in early drawings fierce, long-extinct animals took the pincer in their throats, struggled, stilled. The ancients had cleared their world of such vermin. And then the long slackness came to the podia. But the challenge of the third planet they discovered—bitter, cold, swarming with toothed life—changed the podia. The slit-eyed spirit returned, and after came the Redeemers, and finally the discoveries that made sense of all things.

What is your concern? whispered the sensorium, knowing attention lagged. The Factotum was ever alert.

: : I . . . I am here because the Tukar'ramin . . .: :

That is seen. Perhaps you need a distractant?

: .: I don't . . .: :

Some educational facet of the Chronicle?

: : Very well.: :

Qath was in too strange a mood, her mind skittering on the surface of something invisible, to digest any literature. She braced herself as the sensorium began, *Harnessing the Collapsed Stars*, and tried to relax. The introduction quickly shuffled through conventional lore about the nearly burnt-out stars. They imploded, their pyre a flash seen across the galaxy. The smaller ones left cores of pure neutrons. Spinning, their polar caps spitting out particles, they beamed frantic searchlights, pulsing steadily; galactic lighthouses. A useful source of energy. Once the spinning slowed to three *hextons*, the podia could approach. Teams of strandsharers blocked the circling streams of par-

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ticles, dammed the energy, silencing the pulsar, converting it to useful purposes—

Without warning the thing came welling up from inside. Qath met the fear for the first time and saw its face in the images swimming before her. A nebula drifted, shimmering with the delicate pink of birthing stars. It was a backdrop to a spot where a pulsar flickered. Across the thin sheet of light oozed a dust cloud, blotting the nebular face, a precise image of the death that awaited all of the podia, all beings, everything. Nimfur'thon, first singed brown and then blackening, her flesh crisp and brittle, cracking away. Nimfur'thon was nothing now, gone. Qath felt sadness for her strandsharer, for the spirit that had quadded simply with her in the warrens of their birthworld. But that sadness was the mere skin of the beast that slouched below, the thing Qath could not voice to herself until this moment, as the dustlanes blotted the nebula's glimmering. Dust. Darkness. All-swallowing death.

Qath felt a chill of dread, not for Nimfur'thon, but for herself.

Qath pressed for the Factotum.

Yes? Your instruction is not complete—

: : Forget that. I want the Chronicle again. The Interlopers.: :

The usual history was there, in abundance. How the Exodus began, once the race had seen the challenge and understood what the landscape of science implied: the holy cosmic view. How the Interlopers opposed the Synthesis. The debate. Efforts to bring the Interlopers into the starswarming community failed. They deflected arguments, refused to understand bald facts, evaded reason. Eventually they died out (why? the sensoria skipped over this point). Or, they fled, fled to become the Remnant. At last united, then, knowing the truth, the race went on to—

Yes?

: : The Interlopers—their teachings? Those are not mentioned.: :

That is not customarily requested.

: : I am requesting it.: :

Certainly.

A gloss of more history. Dates, places, facts—planets and eons, now all faded. Then, plunging on, Qath was suddenly in the midst of the Interloper's own era. Pale sensoria outlined the Interloper vision, quoted their texts. The death of the individual was a fact, they said, brute and unavoidable. There was no sense in the Exodus, the starswarming. There would be no rebirth for each of the podia. There was no hidden message in science.

> It is our station to live within laws that give us being, but offer of themselves no purpose or promise, no triumph as a species. The universe allows us a place in its systematic workings but only cares for the system itself, not us. Even this manner of stating the truth is misleading. The world outside ourselves is in fact incapable of caring. We exist as a random happening in

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a world which is orderly in its laws, but without any plan beyond the gravid workings of the rules of dynamics.

Qath recoiled, as though an eating strand had suddenly writhed and turned into a serpent. Here it was, what she had feared. Now it was substantial and unmoving, a solid chunk of history. Other podia had seen the same vast chewing abyss. The world was a rotten, hollow thing. One touch and it split.

Qath's heart pumped erratically; she could sense each surge through a different tube. The sensoria went on. The Synthesis was refuted. The history of the Exodus, carved under a different knife, became unrecognizable. There was talk of religious mania.

But the Synthesis was *not* religion, Qath argued to herself, it was a *discovery*. Religions had come and gone before. None had caused the podia to rise as one.

But the logic rolled on, over Qath's objections. The images flared, one by one: spindly podia smashing nests, cutting strands. Interlopers gutted, wailing, and hanging to shrivel under strange suns, their hivethons taken to fuel the Exodus. The Synthesis spoke of rational podia seeking the light—did this look like the labors of reason? How could the Synthesis be so sure of its assumptions?

Qath snapped the sensoria off and yanked at the helmet.

You leave all these incomplete—

: : Yes, yes. So?: :

It is not done. No benefit accrues from—

Qath listened in silence. She remembered that the Factotum was, after all, a stunted podia from the far past, a mere few lobes salvaged for this use. Best to humor it. Then an idea came.

: : Surely, Factotum, surely,: : she interrupted. : : I am disturbed by the Interloper lies, that is the reason. But I have a query for you. Only one as old and wise as you can answer it.: :

A warming burr: *I will, of course, try to—*

: : Your other lobes—those which did not survive. Where are they?: :

My other—? I am not aware—

: : You don't sense something missing?: :

My earlier self, you mean? I . . . I do not know. Sometimes I remember doing young things, yes. But those parts are gone.

: : Gone where?: :

A . . . away. They are not functional.

: : Not alive? Not anywhere?: :

No, I think not. I would sense them if they were . . . I, I, this brings pain to me. Please . . .

: : Of course. Forget what I said.: :

Qath realized that the Factotum would take the words literally and erase the conversation. Perhaps that was just as well. The poor fractured creature could not deal with these questions.

Perhaps, Qath told herself grimly, no podia could.

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Beq'qdahl clacked by, moving rapidly and well.

: : Confluence will begin soon.: : she called.

: : What?: : Qath, distracted by a robot resetting the sleeve of her injured leg, glanced up.

: : The confluence for Nimfur'thon, Slit-eye.: : Beq'qdahl canted her forelegs back with easy grace, her thorax colors and fuzzed eyes rippling with wry humor. Eyelet hairs dilated outward in waves, to signify strandsharer fellowship. : :You have not forgotten already, I hope?: :

Qath burned with embarrassment. Whenever she thought of Nimfur'thon the persistent nightmare flooded over all other memories—bad enough that a close strandsharer was gone, but what the fact implied was far worse . . . Still, she should try to fix thoughts on Nimfur'thon alone. : : Of course not. Some mourn in private.: :

: : A point. I will see you, then : :

Qath decided to cover her confusion with a sly dig.

: : I have not noticed much public mourning, however.: :

Beq'qdahl caught the hint in the words. : : Meaning we all should do what you do not?: : She pursed her anal cavity to show the remark carried no sting.

: : At least I haven't been striving to transfer into orbital weaving.: :

: : So you haven't. A good idea not to. You are inexperienced.: :

: : Your eyes grow drool-dimmed. You mistake this crippled leg shell. I carry four pods, as you.: :

: : And have done so longer, I'm sure you will soon add.: :

: : The thought does leap to the lobes.: :

: : Very well.: : She settled into knee-cock, *rachet, rachet.* : : You think I overclimb.: :

: : You came here a quad. I spanned less area than you, it is true, but I did have four legs. I still do. For you to attempt orbital weaving before *I* do—: :

: : You know I had much experience at seeding the gaseous envelopes of the red giant stars. True, our technique was different—but we did work in free space.: :

: : *Cow labor*,: : Qath rattled out with sudden viciousness that surprised even herself.

: : Not quite. We plant the spores, yes. The plasma filaments which grow on the star surface froth up, spitting out starlife—waste matter, for them.: :

: : *Dung collector*!: : Qath smoothed her eyelet hairs and oozed red pap through them, to show lacings of jest.

: : An element of wisdom, there. The filaments live—technically speaking, though to me they are only arrays of field quantities, vector summed—and they shit upward at us.: :

: : Shit which you comb, cooing to them as you do it.: :

: : They spin off thermweb to us. Are we to argue about how it is delivered? The ancients fried many of

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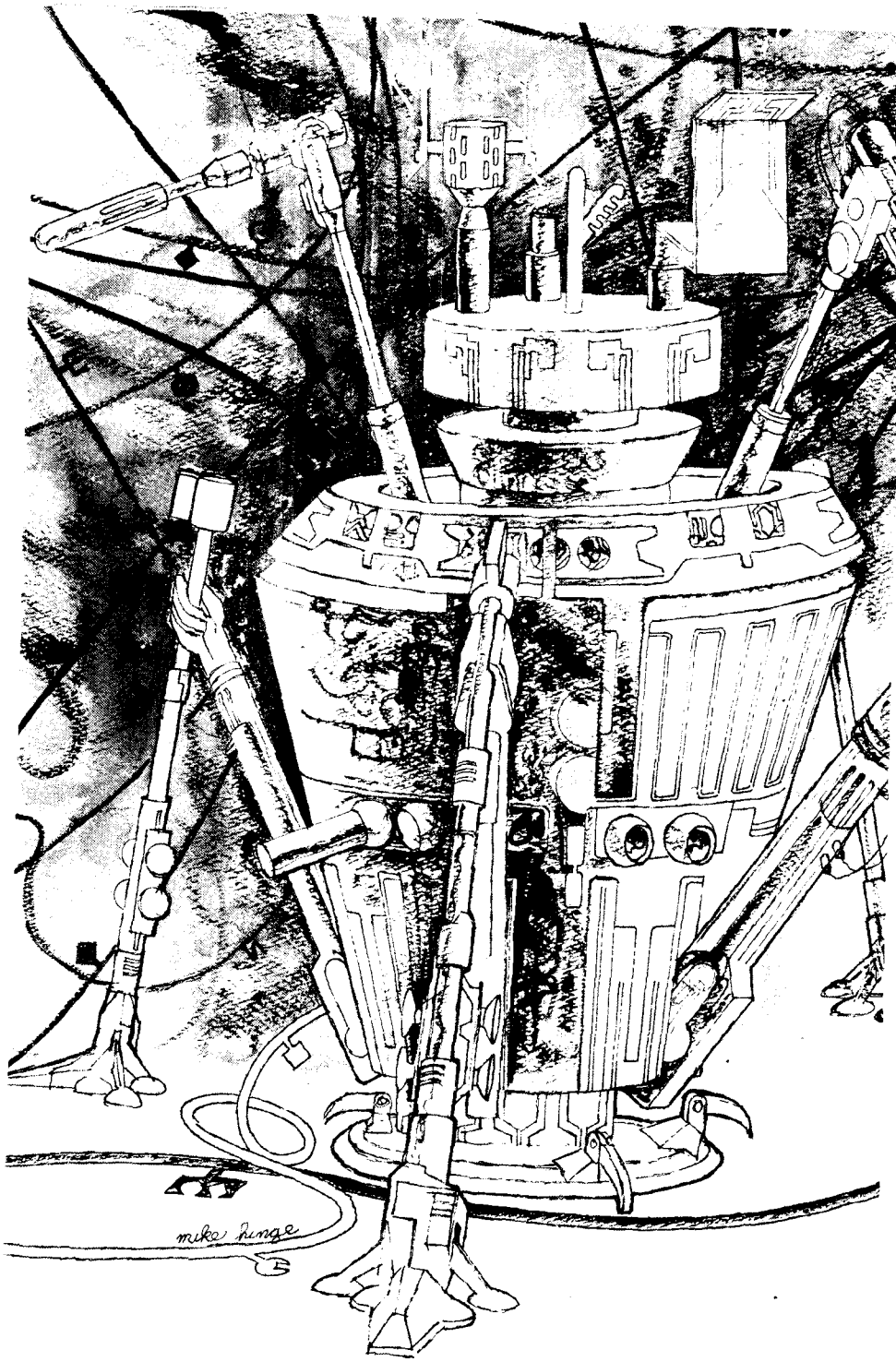

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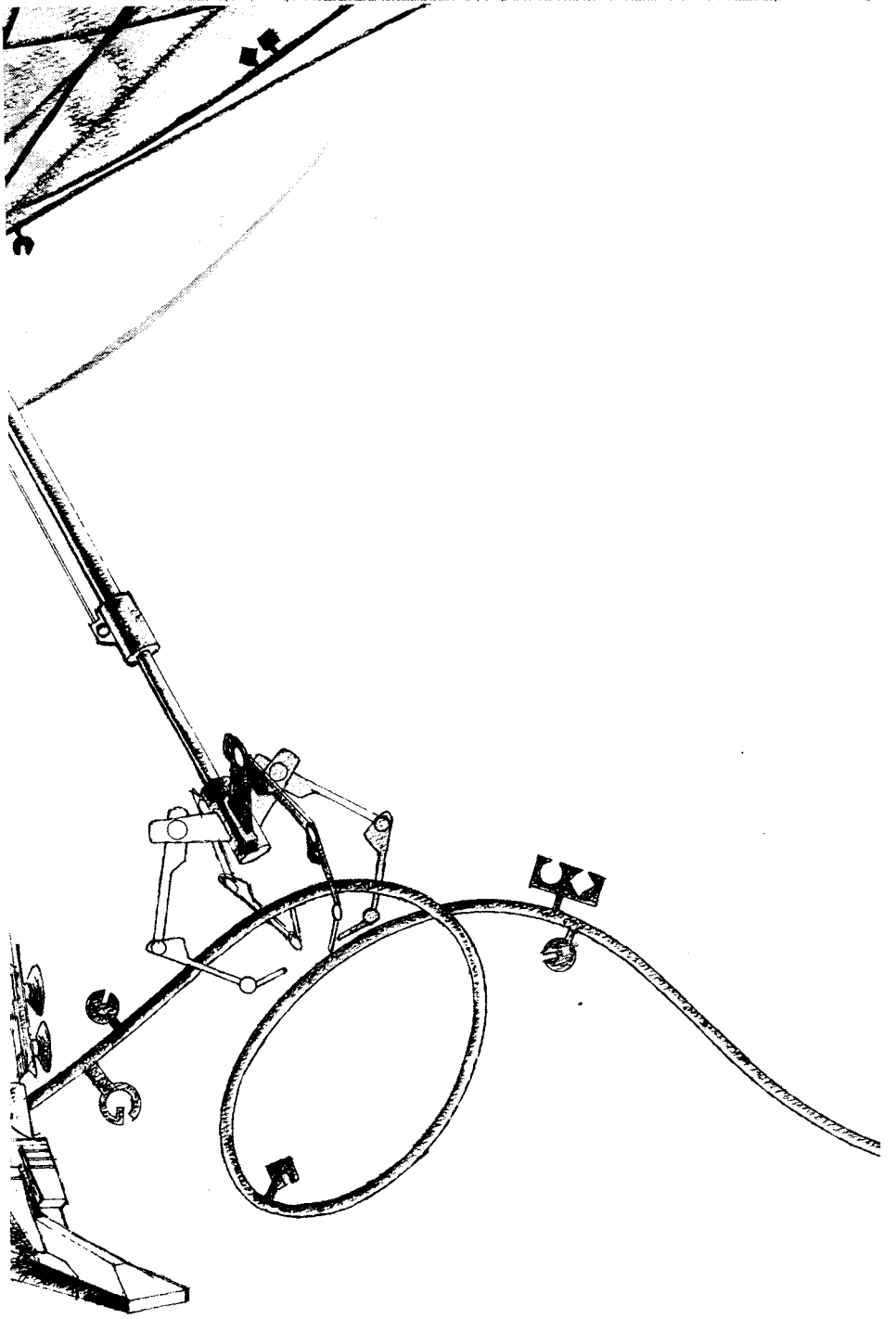

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themselves to develop such farming. It is the easiest method by far to make a Prime.: : Beq'qdahl fizzed an outgassing port in frustration. : : A slippery twine for hoisting oneself upward, however. No advancement.: :

: : That is how you came to have a mere four pods when you came here?: : Qath had suspected something far more inglorious and interesting.

: : Yes. Promotion comes slug-slow for thermweb farmers.: :

: : The Factors have their reasons, I'm sure.: :

A pause. : :Qath, are you troubled?: :

She replied, sharply chittering, : : Why? You expect *applause* for your career as shitmonger?: :

: : No, just that your words say one thing and your cilia, your thorax spectrum—they say otherwise.: :

Fear darted through Qath. Could Beq'qdahl read what she truly felt? Did Beq'qdahl know? Qath started to compose a crushing remark and then thought better of it. : : I have only as many pods as you, Beq'qdahl, but I am still your senior. My thoughts are my own.: :

: : Very well. I hope your precious selfhood remains composed, even after I am promoted to orbital weaving before you.: : Beq'qdahl clattered her ossicles in jeering symphony, excreting bile juice from their seams, flooding the tunnel with an acrid tang. : : If we be rivals, let there be no pretending otherwise.: : She exited, clanking a rear waste port.

Qath brushed away a ratlike service robot which was polishing its handiwork. Beq'qdahl was a competitor, of that one could be sure. For a passing moment Qath had wanted to unburden herself to Beq'qdahl. That would have been an error. No one could help. But still . . . if she could find even a gesture, a word . . .

Stamping heavily out of the tunnel to try the fixed pod, ringing and clacking, she noticed a reference output in the ceramic wall. Something nagged at her, something from the simmering anxiety within. She punched for General Information, gave indices and scanned

> The Synthesis: (1) Realization that a continuity exists between inert matter, through the grand design of the early universe, and intelligent life today. Now accepted by all, this cosmic perspective may be seen as a culmination of all the ancient religions, though of course it is erected on a foundation of the scientific . . .

Continuity. That meant things went on. Stated so baldly, in austere and objective lines, the phrases had a certain power. A tiny crevice, but Qath took shelter there.

The podia assembled for the confluence in an ancient cavern deep in the hive burrows, one carved early in the history of the brood. The walls were smoothed by time and the scrabbling of pupa, and they reflected in watery images the mingling, chattering podia.

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Dani'vver appeared at the entrance of the confluence portal and issued the ritual call, syllables booming down from the arched ceiling. As custom required, the crowd ignored her and kept on making motions at the machinery spotted across the floor. They did no labor, of course—the devices were ancient, stiff from neglect. It was only necessary to appear to be working. The desired impression was somewhat undercut by the swirl of colors as the podia clustered around the frozen machinery, talking (a few were eating; the day waxed late). None wore the gray, rough work sheaths of a laborer. Instead, there were ballooned legments; rosy crescents of flapping headdress; fuzzed cilia; rainbow washes of sweet-scented pus that set off artfully inflamed eyelets; teased tracheae plumes; carapaces of steel-blue sheen; pearly castanets of animal bone, jangling from each legjoint of the myriapodia; fresh encrustations of mica or baked pumice; on those recently promoted, the gleaming leg they had earned, polished and bright amid the tangle of their tarnished pods; ringing, coppery antennae; huge tasks; pulpy and swollen bladders of those recently augmented with artificial digestive tracts; flashing quartz lens-eyes; sensors, glowing like jewels in oil.

Dani'vver's call again rolled over them and this time the podia answered, swarming up the laddered strands and into the confluence hole. As they creaked into knee-cock, Nimfur'thon's image formed above them and the traditional invocation began, a ringing voice thanking the laborers for quitting their tasks to come and honor a fallen strandsharer. Qath paid close attention, though some nearby buzzed with conversation. This died away when the Tukar'ramin appeared on high, melting into being above Nimfur'thon's fading image.

Transmitting on several harmonics, Tukar'ramin's deep voice intoned the Verities. How perturbations of the Ylem clumped the balls of spinning gas, which flattened. The cores of some young galaxies flared hot: quasars. We see these far pinpricks of light even now, because the light of their birth throes reaches us across the universe. These galaxies are ripped apart by the double-armed excretions of black holes, and their satellites, the accretion disks. These cancerous growths blow away the gas and dust. In such disrupted, elliptical galaxies new stars form poorly. Only the benign spiral galaxies provide the mild conditions necessary for life. From the primordial epochs, gleaming across the universe to us, we glimpse only the catastrophies, not the quiet spirals. On those unseen wheeling disks stars bake heavy elements, organic compounds thrive, planets spin, life struggles upward.

Qath became drowsy. Multipodia nearby sent covert chatter on their private bandwidths. The Tukar'ramin surely overheard them, but still droned on. The familiar litany:

Life that was Nought mastered the energy resources of a world. ■

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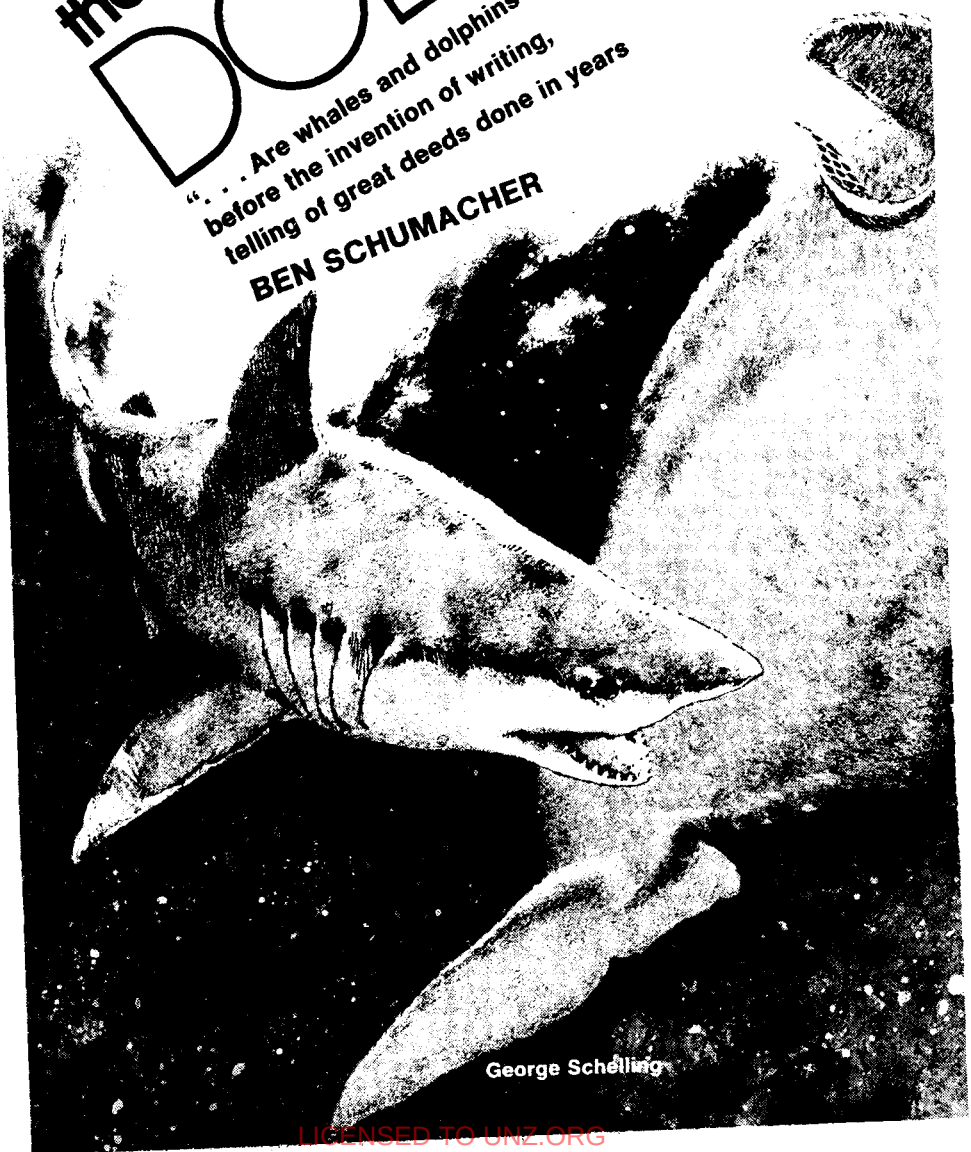
the great gray DOLPHIN

"... Are whales and dolphins like human Homers before the invention of writing, telling of great deeds done in years

BEN SCHUMACHER



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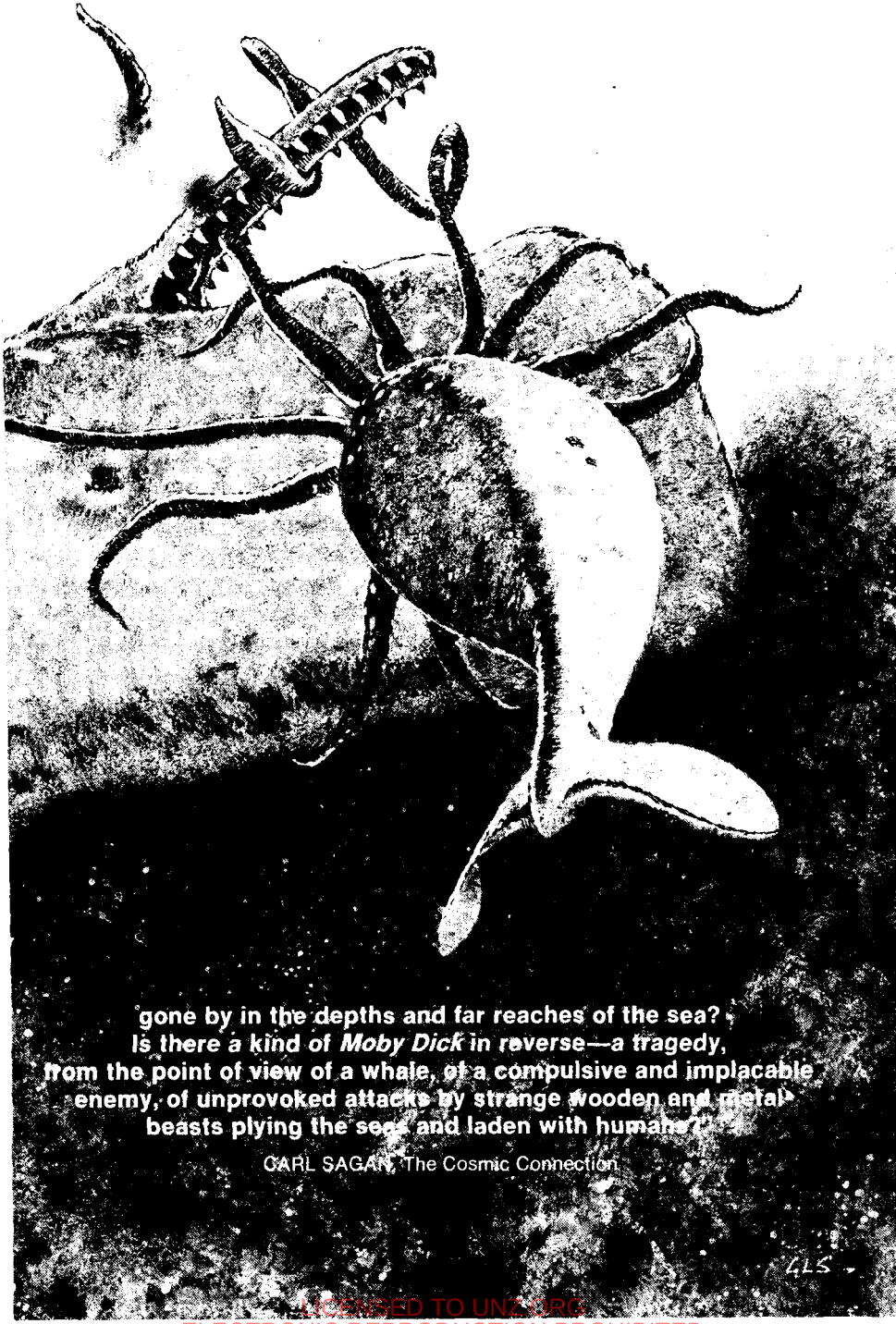
gone by in the depths and far reaches of the sea?
Is there a kind of *Moby Dick* in reverse—a tragedy,
from the point of view of a whale, of a compulsive and implacable
enemy, of unprovoked attacks by strange wooden and metal
beasts plying the seas and laden with humans?
CARL SAGAN, The Cosmic Connection
4LS

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The Great Gray Dolphin
TRANSLATOR'S NOTES

This is the first complete translation of any work of Cetacean literature; therefore, we feel that in these notes certain liberties and conventions need to be explained. Dolphin language, as shown by Dr. Richard Carter in the pioneer paper on Cetacean translation nearly four years ago, differs widely from English, or any other human language (possible exceptions include the curious whistling languages of the Mazataco Indians of Mexico, the inhabitants of Silbo-Gomero in the Canary Islands, and the natives of Kuskoy, Turkey). For one thing, Cetacean has a far greater rate of information than any human language; also, it is highly tonal. Therefore, it was necessary to make extensive use of computer facilities in preparing this translation.

The actual epic (for such it is) in Cetacean lasts perhaps twenty minutes; unfortunately, only about sixty percent was able to be translated. Thus, this is a very "loose" translation. One particular difficulty we encountered was that of translating names. We could not, of course, leave them in their original forms, for Cetacean cannot be written in the Roman alphabet—or, if it could, the names would surely be unpronounceable. Instead, we have invented substitutes for the names of the characters, and attempted to identify Cetacean place names with their human equivalents.

The original epic is divided into sections, and the translation has preserved them in their original positions. Later, extensive computer studies revealed a rhythm pattern previously unsuspected (which, we found to our amusement, the dolphins had informed us of months *before—we stupid humans just didn't get the message), which we represent here as the division of the epic into lines.*

The value of the computer as a translating tool for use in Cetacean dialects (i.e., Dolphin, Sperm Whale, and the various Baleen speeches, as well as Killer Whale) cannot be overstated. Without the ample computer facilities of the Massachusetts Institute of Technology, the present translation would have been literally impossible. The original "cracking" of Cetacean by Dr. Carter would never have occurred in the first place without computer sound analysis.

In closing, I would like to thank a number of people for their help, encouragement, and guidance in the preparation of this epic. I would certainly be ungrateful if I did not thank Dr. Tom Harrison and Mr. Oscar Evans at M.I.T. for their aid in the programming of the Cetacean language on the IBM 420a computer there. Also, I would like to thank Dr. and Mrs. Richard Carter, for their untiring work with the dolphins. But most of all, I would like to thank

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Hector and Daisy, the dolphin pair whose self-sacrifice and hard work (harder than ours, I assure you) made this possible.

Dr. Robert Gerard
Boston, Massachusetts
August 24, 1991

THE GREAT GRAY DOLPHIN

1

Bright sparkled the Pacific waves beneath
The shining sun of old upon that day;
A perfect day indeed.
Fish were plentiful, and the sky cloudless,
And the sperm whale herd swam among the white waves.
Playfully they swam, leaping, chattering.
Life was good for the herd of Pindar,
Existence held no ill for them,
And death seemed remote as the stars.[1]
The herd was small, but a dozen strong:
Three young, four calves, and five cows,
All led by the great bull Pindar, of note
As much for his wisdom as for his strength and size.
And, as his father, the young Odontus
Promised wisdom as the years would pass and he
should lead the herd. But this
Was many years in the future, and the whales,
Knowing well that what shall be shall be,
Wisely live for the day, leaving tomorrow for
Tomorrow's children.
Little did the herd suspect that in that day's foreboding
Future lay not just death but slaughter complete,
And nameless obscenity and unutterable horror.
For, far away, moving silently
The black-hulled horror slid ever closer to the herd.
Behind it lay more ships of men, more black messengers,
And all came ever closer to the herd of Pindar.

1. It has long been known that dolphins and whales are able to see the stars, but this is the first evidence that they have ever bothered to look.

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The ships were heard[2] some distance off,
But the ships of men were nothing new, and such
Had passed before, and boded no ill.
So Pindar directed to ignore the vessels
And let them pass unmolested.
But still the sleek ships approached,
And their presence started a discussion among the young:
"Is it wise," asked one young cow,
"To allow a ship of man to approach so closely?"
"Yes," said another. "The ships of man bode no good.
Have not we heard tales—?"
But Pindar, hearing this conversation, said:
"Are we not curious of man, and do we not follow him
Upon occasion? Therefore, let us allow man to pursue
His own curiosity about us." And thus it was,
Until Pindar, seeing that the vessels drew closer still,
And thinking of the danger of collision,
Ordered a berth to be given to the vessels.
But the ships closed the distance quickly and with purpose,
And soon were in the very midst of the herd.
Then, a cry came from a cow;
A cry of agony and of pain as the sharp spear pierced her.
And, a moment later, another cry,
As still another received her wound.
And then, in less time than it takes to tell,
Mighty Pindar himself felt the scratch of a harpoon.
"Flee! Get away!" he commanded,
But the herd was confused, and two calves had been speared.
Odontus's mother, with him close beside,
Swam forth, but not even she
Was to escape the touch of death.
One ship lay between her and the open sea,
So she dived, and as she did so,
The flying harpoon lashed out and stabbed her,
Burying itself deep within her body.
She cried in pain, and then,
Warning her calf, cried out: "Go! Swim away!
I shall rejoin you later to the south!"[3]
And Odontus, stricken with terror, swam
Away to the south as his mother dived

---

2. Whales and dolphins use acoustic means (i.e., SONAR) for long-range detection.

3. This is, at best, a guess. Dolphins and sperm whales use a complex system of direction based upon wind and water direction, not to mention the acoustic properties of the water (which, in turn, refers to thermal layers, etc.) and possibly the phase of the moon. Extensive computer studies have yet to yield a definite answer, and Cetacean navigation remains just as mysterious as it ever was.

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Toward the deep.
He reached a kelp-bed, a place of safety, and stopped,
Listening for the call of his mother.
But no whale-call broke the rhythm of the waves,
And no sweet voice interrupted his fears.
He cautiously swam back,
And the sight he saw wrenched the heart and soul[4] from him:
The three young, his brothers and sisters;
The three calves, just born this season;
All five cows—Odontus's mother, too;
Yes, and the great bull Pindar—all lay lashed
Against the sides of the ships,
Being cut with hooks and blades and spears
By the tiny vermin that swarmed over the surface-monsters.
Odontus cried, leaping into the air with rage,
"One ship for Pindar shall I destroy,
And another for the herd;
And three ships for my mother's revenge shall I consign
To the ocean's darkest depths. This I vow."

2

Even as Odontus spoke these words,
The jackals of the deep converged to join the kill;
From the deepest depths of the Pacific came
The Old One, the great squid of the deep,
Whale-food turned whale-killer,
The last of his giant kind, survivor from the ocean primeval,
Centuries old and larger than a bull Blue whale.
Then, too, from all sides came the sharks,
Maddened by the bloodshed there,
Striking even at each other, so maddened were they;
The great whites would eat the smaller ones upon occasion,
And the tiny remoras would gobble up the scraps.
Hundreds, thousands of insane sharks,
Circling, striking in the waters, now clouded with blood.
But the cries of the whales had not gone unheeded,
For even as their carcasses were sliced and cut,
The noble dolphin school of Dominius was drawing nigh.
But Odontus knew not of these things,
For his grief had quite overcome his senses.
He lay still in the water, wailing in fear and anger,
Gazing only at the dismembered bodies tied to the ships.

4. This is at least an inadequate translation, perhaps erroneous. Translation of dolphin and whale intangibles is a difficult problem, and should be regarded skeptically.

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But the crazed sharks, lashing about from hunger,
Spied the defenseless calf, and swiftly closed upon him.
Too late Odontus realized that safety lay in flight alone,
And he found himself in the midst of the seething cloud
Of sharks, without a means of escape.
He thrashed around for a moment, trying to find escape,
And the sharks, thinking he was injured, attacked.
A great white bit his tail, but he shook him off,
Leaving a ragged, bleeding wound
Which enraged the rest of the sharks by the scent.
A few of the boldest tried to strike,
But each time, Odontus struck them in the nose
Or in the belly with his tail,
And thus kept them at a distance.
But more sharks were coming, and all were growing bolder,
And the scent of blood was strong in the waters;
Odontus could not hold them off forever,
Nor could he take all on in battle at one time.
Thus, his fate seemed sealed.
But the dolphins, hearing the cries of Odontus as he
Bravely battled the sharks, came swiftly,
And fought desperately to save the calf
By fighting and poking and jabbing the sharks with
Their snouts, and slapping them with their tails.
And the noble dolphins prevailed in short order
(For are not dolphins the fittest fighters in the sea?)
And surrounded the sperm whale calf to protect him,
And started to confer among themselves.
Odontus, having learned something of the dolphin tongue
From his father Pindar, interrupted.
"Friend dolphins," said he, "I am Odontus, the son of Pindar.
The whales you see being butchered were once my herd.
I am grateful to you for saving my life,
But without my herd to protect me, my life is forfeit.
Thank you again, even if your efforts are wasted."
The school of dolphins was amazed.
"Is it but a calf who speaks thus?" asked one.
"Listen, a sperm calf who speaks our own tongue!" said another.
"Truly," still another said,
"He is the seed of Pindar, the dolphin's-friend.
He has inherited his father's wisdom and intelligence."
And old Dominius, the leader of the school, concurred, saying:
"Indeed, here is a sperm calf whose wisdom
Puts mine own to shame! If such wisdom be his lot as a calf,
Would that he be grown.

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Has it ever been the dolphin's way to have no compassion?
No! Let us adopt Odontus, the son of noble Pindar,
Into our own school, our families. Though we,
Who are small and weak compared thus,
Can offer no milk for this calf,
Perhaps we can raise him still as our own. Shall we?"
And the school cried, "We shall!"
Odontus's knowledge of dolphin tongue was limited,
And thus much of these words had passed him by;
And, being a calf, he had no mind for such:
"What is happening?" he demanded.
Dominius replied, "Years ago, your father and the dolphins
Were close companions. Now, we are repaying that friendship
By adopting you as a member of our school."
Odontus was bewildered: "You have been too kind to me
Already, and I have no mind to accept more. Leave me be,
And let me mourn my herd's destruction in peace."
But the dolphins' leader, Dominius, said to him,
"Having accepted one kindness, do not begrudge another.
That is our law, and we shall hold you to it.
You have accepted the kindness of our giving you life,
Therefore, do not begrudge us the pleasure of preserving it."
And Odontus, seeing that he had no choice, consented,
And swam with them away from the evil place.

3

If ever an orphaned whale can be at peace,
Then Odontus was from that day forward.
He swam with the dolphins,
He fished and ate with the dolphins,
And with the years grew strong and large.
The seed of Pindar grew mightier than the entire school,
And, true to the words of Dominius,
Was great indeed among the dolphins.
They called him "The Great Gray Dolphin,"
And he bore the title with pride.
But a dark and gloomy cloud forever hung,
And restrained him from his peace complete.
For he knew that someday he would have to kill Man,
For a whale's vow is a sacred[5] trust,
No matter how impassioned it may be,
And he had vowed to kill Man.

---

5. "Sacred" is of questionable usage in this case, although quite close to the meaning intended. (see note #4)

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Thus it had to be.
"You are no whale," said Dominius. "Revenge is not yours.
You are a dolphin now.
Though large and powerful, your spirit[6] is one of us,
And the place of the dolphin is not to kill,
But always to preserve the life of Man.
This is our ancient, sacred trust."
Odontus replied. "More sacred than a whale's trust?"
Dominius said, "More sacred than any other,
This is the trust which you must keep."
And Odontus said, "So long as I am dolphin,
That is how long I keep dolphin trust."
Dominius, hearing this, cried out, "By the Others!
Was there ever one whose wisdom passed this?
For you are dolphin until your debt of life is paid;
Forget not that you exist because of the school of Dominius,
Which saved your life when it was forfeit."
"Your words are true," spoke Odontus. "I cannot
Betray your trust until my life-debt is paid."
And so Odontus grew among the dolphins,
Learning much that he had not heard before,
Excelling in wisdom and loyalty.
He listened well to the old dolphins as they told
The lore of the ages, passed down from generations past.
He heard of times when men and dolphin were closer,
And of places on the Earth where men and dolphin were close
Even unto this late day,
And he heard when they spoke of disasters, and typhoons,
And eruptions of volcanoes both in the sea and upon the land,
And he heard of knowledge lost, and knowledge gained,
And of dolphin-wizards and the Golden Millennia of yore,
And he heard of the Plague, and the Seven Famines.
But most of all, he learned of the Others.
He learned of those sky-dwellers, and of their coming
When men were uncivilized, but noble still,
Not killing but for food, not harming but for need.
And Odontus learned well the Covenant, which charged
The fate of Man to the dolphin race, and promised to return
To the Earth again one day.
All this and more Odontus heard,
But always he remained aloof when games were played
Around the ships of men, not because of his lack of nimbleness,
But because he feared them still.

6. It should be recognized that "spirit," while approximating the dolphin idiom, is not quite correct in connotation. (see note #4)

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A summer passed, then two, then three.
And Odontus grew mightier still,
And the seed of great and wise Pindar
Grew ever more like his father as the years passed.

4

Fifteen years passed since the day
That Odontus had become a dolphin.
The sea was bright with the springtime sun,
And fish were plentiful within the Antarctic seas.
The dolphin school frolicked as did that herd of years ago;
Leaping, leaving cares to those unhappy,
Laughing, loving, swimming in pure delight of living.
All except Odontus joined in,
He, as always, remained aloof,
Propelling his vast bulk beside the frolicking herd.
The years had been kind to the school of Dominius,
And the old Dominius still led them on.
The years had been no less generous to Odontus,
For he was as long as ten dolphins,
And more massive than the entire herd of Dominius;
Powerful in his flukes and in his massive head;
He was indeed no less a credit to his species than Pindar.
And on this wonderful springtime day,
He brooded about his future.
As a whale, he held the sacredness of his vow;
As a dolphin, by adoption, the Covenant was his vow.
Honor could not be satisfied, for the two excluded each other.
So Odontus must have wrestled with his choice:
To be a dolphin, or to be a whale.
And as these thoughts around him swirled,
The jackals of the deep were gathering for the kill again.
A pack of killer whales,
Dolphin cousins gone mad a million years ago,[7]
Prowled unobtrusively, paralleling the school of Dominius.
Even Odontus, in his brooding, did not notice.
But the sea became hushed as the battle lines were drawn,
And the Old One came from its deep-darkest lair.
Up from the bottoms, as on that day five and ten years by
For purposes unknowable, as if only to watch.
For many minutes the killer pack stalked their prey,
And, at last, closed in upon them.

7. This line may be a figure of speech, or dolphins may be aware of their evolutionary heritage. In the latter case, how they are aware is a subject for further study.

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The dolphins, blind to the danger for so long,
Heard the sleek forms slice the water as they attacked,
And, seeing that the only hope was in flight alone,
Turned and swam as fast as they could away.
Odontus, seeing and hearing this,
Became enraged as only a sperm whale can.
He cried, "Killers of dolphins, swim off!"
But the killers, unknowing and uncomprehending,
Did not heed these words, and began to overtake the school.
Odontus did not wait a moment longer.
He hurled his massive, fighting bulk into the pack's midst,
And thrashed and fought like no other creature could.
He was as long as three killers,
And more powerful than ten,
And the pack, confused and bewildered, routed
Under this new and unprecedented assault.
Odontus, his rage spent, ceased his slaughter.
Around him floated four killers, dead;
Five more swam away unwhole.
The Old One, having watched from afar,
Returned to his cold depths, apparently satisfied.
The dolphin school, the school of Dominius,
Swam back in mystification, for
Never before had a killer pack been beaten off.
They touched the carcasses fearfully, silently,
And soon sounded such a cheer of praise for Odontus
That the likes of it had never been heard before.
But Odontus, his mighty voice roaring, bid them to silence.
Then Dominius spoke, saying,
"The deed we see today is a mighty one indeed,
One that will endure in song for a hundred generations.
And the name of the Great Gray Dolphin shall too survive,
Until the Others come once more."
But Odontus would have none of this.
"I am lauded for saving the lives of many of you," he said.
"This deed I have done is noble, that is sure,
But no more noble than the deed you did fifteen springs ago.
You saved my life, now I have saved yours.
My blood debt is paid, I owe you no more."
Dominius could well see where Odontus's thoughts led.
He said, "Now we all are equals, you a dolphin and we,
And no debt is owed and no scores are to be settled,
So abide with us longer, as an equal among equals."
But Odontus, disagreeing, spoke:
"You well know that that is not my mind.

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'An equal among equals' is a noble dream,
Of the noblest of that noble race, the dolphins.
But I am not a dolphin, nor can I ever truly be,
For behold, my body is that of a whale, and
My heritage lies with the whale-kind;
A whale will I ever be.
Therefore, say no more that I am dolphin;
For I am now what I always was, a whale.
Thus I bid you, my friends, farewell."
Odontus swam away into the cold, bright waters,
And the school of Dominius swam its way also.

5

In previous chapters, we have, while not translating every line of the epic, translated enough to convey a skeleton of the idea of the chapter. In this chapter, this is not the case. At no point in chapter 5 is there more than three lines in a row that may be translated in human terms. It would seem that the message and concepts conveyed in this chapter are purely Cetacean in nature, and no amount of analysis by computer has shed any light about its meaning.

The frequent use of the signals previously translated as "soul," "spirit," and the modulated pulse-chain for the "Others" indicates that perhaps this deals with some sort of internal conflict on Odontus's part, a struggle between dolphinness and whaleness. This hypothesis is confirmed by the inflections of the lines, which are the sort termed "Introspective" by Dr. Carter in his paper on Cetacean grammar and syntax.

Hector and Daisy, while distressed to a certain extent by our lack of understanding, seem unable to reword this section in translatable terms. However, they do not see any reason why this section cannot be omitted for the human reader, for it does not advance the plot in any substantial manner.

Perhaps some day, when man and dolphin understand one another better, this chapter will be rendered in human tongue. But until then, we must skip it and go on.

Robert Gerard

6

Through the crystal waters plied
A dark-hulled ship of Man.
Slim and sleek, with sails billowing above the water,
It ran downwind at a great speed.
Odontus heard the ship that sped
Above him, and wondered.
Then, deciding to wait no longer for his fate,
He shot upwards from the depths toward the unsuspecting craft.

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His mighty head rammed it from beneath,
And cracked its keel and broke the hull.[8]
It slowed to a near stop from the impact,
And Odontus rammed it again from the side.
Again and again he smashed into the wooden hull,
Splintering it in all directions,
And grabbed the planks and flotsam
In his powerful jaws, and broke them to bits.
The men squirmed and floundered in the turbulent waters,
Victims of a rage that knew no bounds.
And Odontus, in his madness, closed his jaws upon one;
The crunch of bones and the taste of Man-blood was sweet
Upon his jaws, to him as he battled.
The men cried out, but it was all in vain for them,
For Odontus's insanity was sustained.
Six more men died from his terrible teeth,
And the others clung to the small boat and the pieces
Of the ship that floated, sinking slowly.
But Odontus showed no mercy on them either,
For he methodically smashed each boat and piece of wreckage
Until the last of the men were drowned.
Then he bellowed out his triumph:
"I am Odontus, Pindar's son,
Son of he who was slaughtered, yet still I live.
I live to avenge the death of my herd,
To kill the killers who roam the surface of the sea,
And for this I live, and for this I shall die.
Five ships I vowed, and the first is sunk,
And I have eaten my prey in accordance with whale-law.
Four more ships shall I commit to the endless deeps before
In triumph I shall die."
But Odontus's waiting nearly cost him his life,
For the ropes[9] of the dying ship
Upon their journey to the bottom of the sea
Contrived to become entangled in Odontus's flukes,
And thus to impair his swimming.
Far away, gazing cryptically through the murky depths,
The Old One lay quietly in waiting.
Never had it encountered a whale of such power.

---

8. This and several other references tend to indicate that dolphins and whales possess a detailed knowledge of ships and their structure, an inference borne out by conversations with Hector and Daisy.

9. This is our translation of the dolphin idiom which, literally translated, means "kelp-strands."

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Not in its centuries of existence had it seen one
That presented such a challenge.
And the whale-food squid grown excessive,
That hypertrophied mollusk,
Meant to have Odontus one day.
But Odontus was struggling with the ropes at present,
And his available fighting-strength decreased accordingly;
And the Old One saw his chance, and took it.
It rocketed forward, riding its jet of water,
And shot out its two tentacles and enmeshed Odontus
With its eight mighty arms.
It was longer than even Odontus himself,
Having grown without limit in its centuries,
And Odontus was helpless to stop it.
But Odontus's mighty flukes were not arrested in full,
And they still could move and delay the ghoulish squid
From its gruesome objective.
At last, seeing that salvation lay in mighty effort alone,
Odontus arched his huge gray body,
Snapping the ropes as if they were mere seaweed.
For another titantic half-hour[10] the battle raged,
The tenacious tentacles of the squid
Against the sheer power of the whale.
So evenly matched were they,
That the half-hour's passage saw neither the victor.
The Old One, having lost three arms,
Saw that victory, if possible, would be dearly bought.
So he retreated, leaving the sucker-scarred Odontus
Breathless in the sparkling light of the waves.
Odontus bellowed out a promise
To meet the Old One again one day in combat,
But the enigmatically sentient squid,
Possessing the intellect[11] but not the voice,
Said nothing, though none could mistake
The message behind the great, gleaming eyes.
Thus they parted, each to prepare
For that final contest that both know must come.

7

In the next five summers, three more ships of Man

---

10. Literally, one-fiftieth of a 24-hour period. All short periods of time are treated in this manner.

11. Apparently, dolphins and whales believe that giant squid in general (or, at least, this particular one) possess intelligence of a high order.

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Together with their crews were sunk,
Victims of Odontus's vow for revenge.
And upon each occasion,
Lurking in the dark depths that were his home,
Lay the Old One, looking for the mistake
That would cost Odontus his life.
But much had been learned by Odontus in the years,
And he had grown in length and power as well.
He never forgot the lesson that the ropes taught him:
Never become too entangled in revenge upon Man
To ignore a threat from the sea.
Odontus was truly a great whale, of renown,
Quite as large as the Blue whales he met occasionally,
And the oceans told of his strength.
He plowed through the glistening waves,
His wet, gray skin sparkling as the sun touched it,
Swimming in search of the last of his quarry,
So that he might rest from his quest.
Twice in the years he had heard the distant cries
Of some baleen[12] herd, being slaughtered.
But always he had arrived too late
To save any member of the herds,
Or wreak revenge upon the murderers.
Once, his path and that of the school of Dominius,
Though independent, with all the sea to swim in, crossed.
Old Dominius had died soon after Odontus had left,
So grieved was he at the departure of Odontus.
Pollux, his younger brother, led the herd now
With much the same wisdom his brother had possessed.
The dolphins, recognizing Odontus, cried:
"Hail, O great Gray Dolphin!
Greetings from your brothers in the school of your adoption!"
But Odontus merely replied, "I am no dolphin, noble ones,
But only a whale, and a killer of men."
Pollux, in his wisdom, replied thus:
"No whale speaks thus,
Or addresses the dolphin in the dolphin-speech.
No, Odontus, your words betray you.
A calf becomes the total of all those whom he meets,
For each of the People of the Sea will live in your memory,
And influence your thoughts.
You spent most of your life among this school

---

12. Most whales are baleen whales, which, in contrast to the sperm whale, killer whale, and dolphin, are toothless herbivores.

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As one of us, our brother.
The years have left their mark in you, too,
For, though you appear to be a whale,
Deep within you still bear the soul of a dolphin.
Remember this as you carry out your mission,
And wreak revenge upon Man, upon those who slew your parents.
Deep within you, your dolphin self must be reckoned with,
And you alone can do that, O Great Gray Dolphin."
To this Odontus made no reply,
But he was obviously affected by the speech.
He swam with the dolphins for a while in silence, and said:
"Your words are true, Pollux Dominius's brother;
I am, deep inside me, dolphin even as you are.
Yet my whale heritage beckons,
And my whale honor must be satisfied.
If I had been born in a dolphin body,
No honor would surpass the Covenant.
But I am not, so let this be.
I am a whale, so whale I must remain forever."
With this, he left them behind.

8

Then one fateful autumn day,
When the winds blew fierce upon the waters,
The final dance in the life of Odontus began.
A mighty ship of Man, some say the same
That killed noble Pindar twenty years before,
Fought its way among the swollen waves,
Plying the seas toward shelter,
For the storm worsened by the hour.
Many miles away, Odontus swam,
Rising now and then for air,
Being torn each time by the turmoil of the surface-waters.
But he could see that the storm was starting to pass,
So doggedly he moved on.
Then, without warning, from the darkest black deeps
Of the storm-twisted ocean,
The Old One came one last time.
Five years had passed since their last meeting,
And Odontus had grown much larger.
But the Old One, too, was far more powerful than before;
He judged now that he could win against Odontus,
And he meant to try it now.
Odontus, his ears useless in the noise of the storm,
And his eyes blocked in the murky waters,

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Did not hear the Old One until flight was impossible.
Thus he embroiled in a titanic battle,
A battle for his very life.
The eight arms, three regrown in the five years past,
Wrapped themselves around the struggling whale.
Odontus fought desperately against their strength.
The great squid pulled and wounded with his arms,
And pierced Odontus's side with his bony beak.
Odontus lashed about with his mighty flukes,
And gnawed upon the tentacles that he could reach
With his crunching teeth.
The battle raged on for what seemed forever,
But neither was the victor yet.
Odontus, however, was weakening with fatigue,
While the Old One was as tenacious as ever.
Odontus knew that he would have to outwit the monster
If ever he was to see another day.
With a final burst of strength, he arched himself,
Pulling backward with a powerful thrust,
And the head of the squid was thrown forward.
Odontus, quicker than it takes in the telling,
Snapped his mighty jaws once upon the head, and severed it.
The body of the Old One went limp upon him,
And, one by one, the arms slid from around him.
Too exhausted even to utter a victory cry,
Odontus observed the whale-law, and devoured the squid.
After which, the spent whale swam upward,
For he was weak with the battle and the many wounds.
Torn, marked with the suckers, bleeding from the beak-wounds,
He lay still on the calming surface as the storm passed,
Resting from his heroic struggle,
Not knowing that a greater one lay ahead.
The ship, now out of the storm,
Saw only an injured sperm, resting on the surface,
And thought only of the prize such a whale would be.
They changed course, and made for it,
And plunged a harpoon into Odontus's side.
Odontus's first impulse was for flight,
And he dived downward, dragging the line attached to him,
But he soon realized that this was in vain.
The ship still had him, no matter where he fled.
So he rocketed upward, toward the other side of the ship,
And leaped out of the water above it.
It is no small leap, for the greatest of sperms,
To leap entirely out of the water;

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And its termination is greater still.
Odontus hung for a moment in the clearing sky,
And crashed down then upon the helpless ship,
Raising water to the clouds,
And smashing the ship to flinders.
The mast pierced him, and splintered,
And the rigging bound him firmly.
With this destruction, he was at last spent,
And could do nothing but float in the water and bleed.
But before he succumbed to the many wounds and exhaustion,
He gave voice to one last cry:
"I am Odontus, the seed of Pindar.
My herd's murder is now avenged,
And thus with peace I now meet my death."
Saying this, he gave a last quiver and was still.
And still about that spot the dolphins say:
"Here died Odontus, the Great Gray Dolphin;
The wise, yet foolish, the strong, yet weak.
Here he met his end, after slaying the Old One,
And wrecking the ship of Man that tried to murder him.
Here lies he forever, the Great Gray Dolphin;
Dishonored, yet noble above all."

AFTERWORD

The success of the translation of this particular work of Cetacean literature has encouraged Bob Gerard and his team to tackle longer, more ancient songs. Currently, preliminary recording is underway to translate that most ancient of all the dolphin works, Sons of the Others. I hope to be as much a part of this and future projects as I have been in the past.

Working with the dolphins is a rare privilege; for the Gray Poets, as they call themselves in their more somber moods, are truly a delightful people, full of wit, learning, and wisdom. The fact of the matter is, ***in every case whatsoever, when dolphins and humans come in contact, the dolphins have shown more kindness, intelligence, and wisdom than their human counterparts.*** *There is much we can learn from our distant cousins in the sea; the only question is, will we?*

Richard Carter
Woods Hole, Massachusetts
September, 1991

BIOGRAPHICAL NOTE:

Dr. Richard Carter was awarded the Nobel Prize in Biological Sciences in 1989 for his pioneering work on Cetacean language. ■

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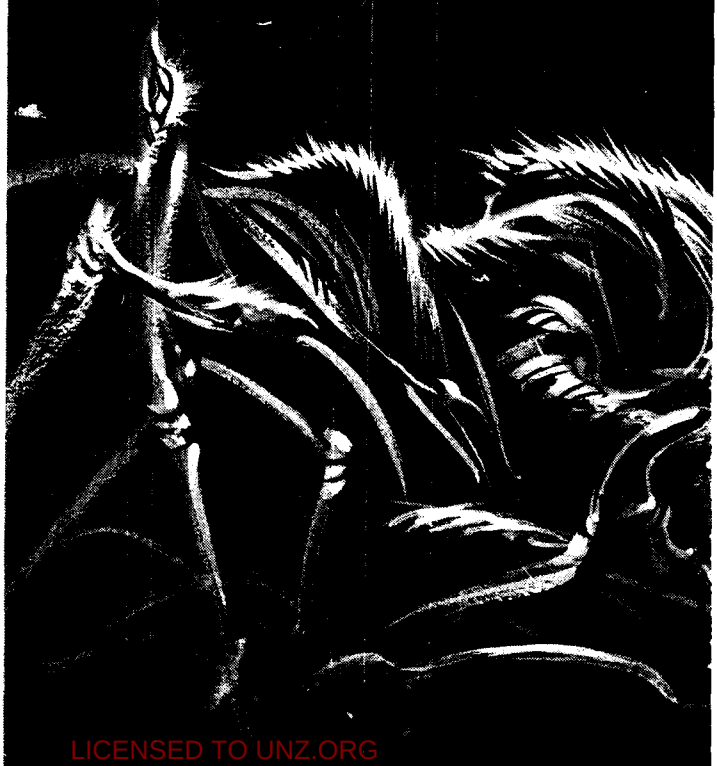
backstage LENSMAN

Take heart, Doc Smith fans! The Children of the Lens have returned!

RANDALL GARRETT

On a planet distant indeed from Tellus, on a frigid, lightless globe situated within an almost completely enclosing hollow sphere of black interstellar dust, in a cavern far beneath the surface of that abysmally cold planet, a group of entities indescribable by, or to, man stood, sat, or slumped around a circular conference table.

Though they had no spines, they were something like porcupines; though they had no tentacles, they reminded one of octopuses; though they had no wings or beaks, they seemed similar to vultures; and though they had neither scales nor fins, there was definitely something fishy about them.



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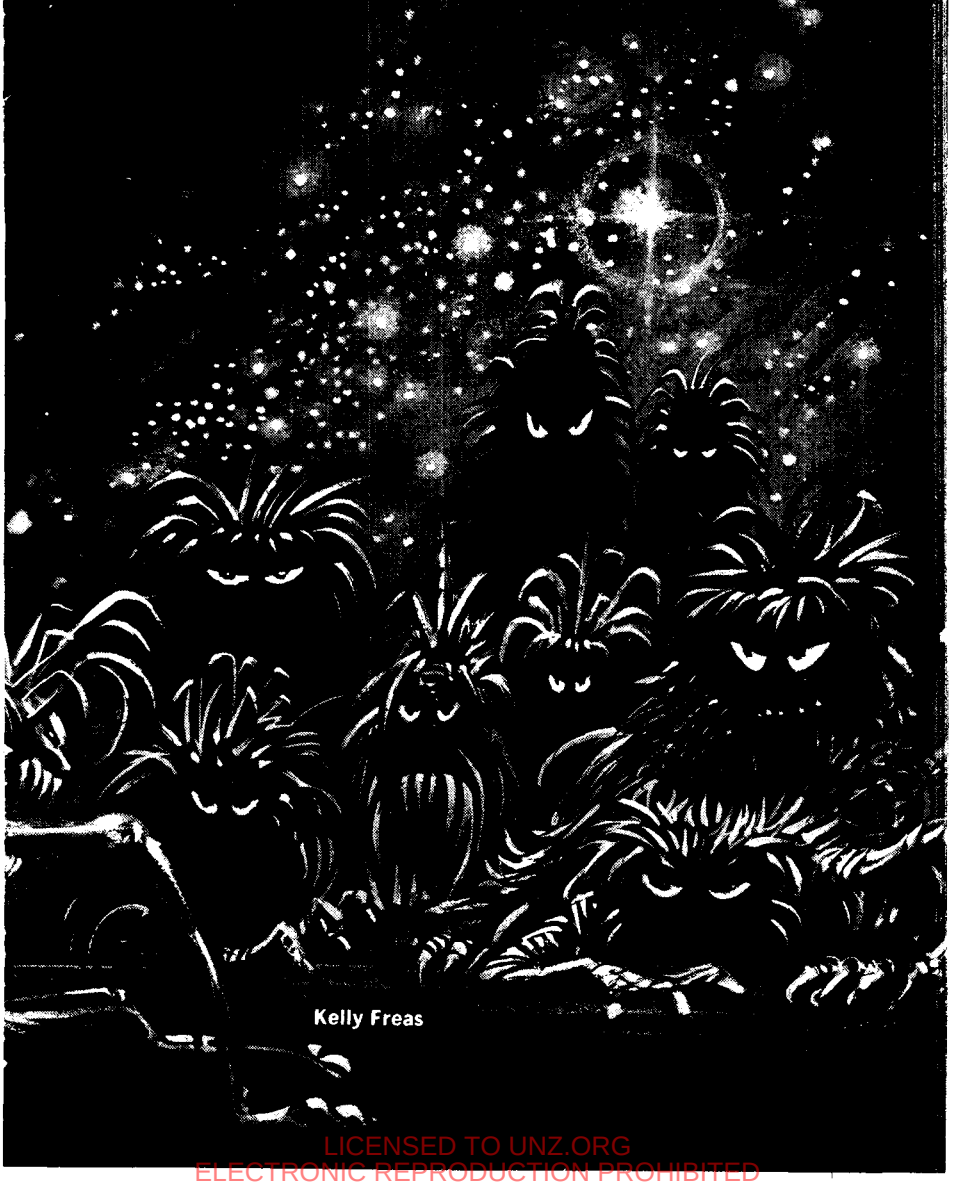
These, then, composed the Council of the Meich, frigid-blooded poison-breathers whose existence at temperatures only a few degrees above zero absolute required them to have extensions into the fourth and fifth dimensions, rendering them horribly indescribable and indescribably horrible to human sight.

Their leader, Meichfrite, or, more formally, Frite of the Meich, radiated harshly to others of the Council: "The time has now come to consider the problem of our recent losses in the



Kelly Freas

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other galaxy. Meichrobe, as Second of the Meich, you will report first."

That worthy pondered judiciously for long moments, then: "I presume you wish to hear nothing about the missing strawberries?"

"Nothing," agreed the other.

"Then," came Meichrobe's rasping thought, "we must consider the pernicious activities of the Tellurian Lensman whose workings are not, and have not been, ascribed to Star A Star.

"The activities and behavior of all members of the never-to-be-sufficiently-damned Galactic Patrol have, as you know, been subjected to rigid statistical analysis. Our computers have come to the conclusion that, with a probability of point oh oh one, the Lensman known as Gimble Ginnison either is or is not the agent whom we seek."

"A cogent report indeed," Meichfrite complimented. "Next, the report of Meichron, Third of this Council."

"As a psychologist," Meichron replied, "I feel that there is an equal probability that the agent whom we seek is one whose physical makeup is akin to ours, rather than to that of the fire-blooded, oxygen-breathing Tellurians. Perhaps one of the immoral Palanians, who emfoze in public."

"That, too, must be considered," Meichfrite noted. "Now to Meichrotch, Fourth of the Meich . . ."

And so it went, through member after member of that dark Council. How they arrived at any decision whatever is starkly unknowable to the human mind.

On green, warm Tellus, many megaparsecs from the black cloud which enveloped the eternally and infernally frigid planet of the Meich, Lensman Gimble Ginnison, having been released from the hospital at Prime Base, was talking to Surgeon-Major Macy, who had just given him his final checkup.

"How am I, Doc?" he asked respectfully, "QX for duty?"

"Well, you were in pretty bad shape when you came in," the Lensman surgeon said thoughtfully. "We almost had to clone you to keep you around, son. Those Axlemen really shot you up."

"Check. But how am I *now?"*

The older Lensman looked at the sheaf of charts, films, tapes, and reports on his desk. "Mmm. Your skeleton seems in good shape, but I wonder about the rest of you. The most beautiful nurses in the Service attended you during your convalescence, and you never made a pass—never even patted a fanny."

"Gosh," Ginnison flushed hotly, "was I expected to?"

"Not by me," the older man said cryptically.

"Well, am I QX for duty? I have to do a flit."

Surgeon-Major Macy handed Ginnison an envelope. "Take this to the Starboard Admiral's office. He'll let you know. Where are you flitting for?"

"I'm not sure yet," Ginnison said evasively, taking the envelope.

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"Right. Clear ether, Gimble."

"Clear ether, Macy."

True to an old tradition, these two friends never told each other anything.

The Starboard Admiral slit open the envelope and took in its contents at a glance. "According to Macy, you're fit for duty, son. Congratulations. And, in spite of everything, that was a right smart piece of work you did on Mulligans II."

Ginnison looked at the tips of his polished boots. "Gee whiz," he said, blushing. Then, looking up: "If I'm fit for duty, sir, I'd like to make a request. That mess on Cadilax needs to be cleaned up. I'm ready to try it, sir, and I await your orders."

The Starboard Admiral looked up into the gray eyes of the young, handsome, broad-shouldered, lean, lithe, tough, hard, finely-trained, well-muscled, stubborn, powerful man who stood before him.

"Gim," he said firmly, "you have disobeyed every order I have ever given you. It always came out all right, so I can't gripe, but, as of now, I'm getting out from under. I've talked to the Galactic Council, and they agree. We are giving you your Release."

The Release! The goal toward which every Lensman worked and so few attained! He was now an Unattached Lensman, responsible to no one and nothing save his own conscience. He was no longer merely a small cog in the mighty machine of the Galactic Patrol—

He was a Big Wheel!

"Jeepers!" he said feelingly. "Gosh-amighty!"

"It's all of that," the Starboard Admiral agreed. "Now go put on your rays, take the *Dentless,* and get the hell out of here!"

"Yes, *sir!*" And Ginnison was gone.

He went to his quarters and took off his black-and-silver uniform. Then he proudly donned the starkly utilitarian gray leather uniform which was the garb of the Unattached Lensman. And as he did so, he made that curious gesture known as Gray Seal. No entity has ever donned or ever will don that Gray uniform without making that gesture. It is the only way you can get the zipper closed.

In his office, solidly sealed against both thought and spy-ray beams, the Starboard Admiral sat and stared at the glowing Lens on his wrist, the Lens which was, and is, the symbol of the rank and power of every Lensman of the Galactic Patrol.

But it is far more than merely a symbol.

It is a lenticular structure of hundreds of thousands of tiny crystalloids, and each is built and tuned to match the ego of one individual entity. It is not, strictly speaking, alive, but its pseudolife is such that when it is in circuit with the living entity to whom it is synchronized, it gives off a strong, changing, characteristically polychromatic light. It is a telepathic communicator of astounding power and

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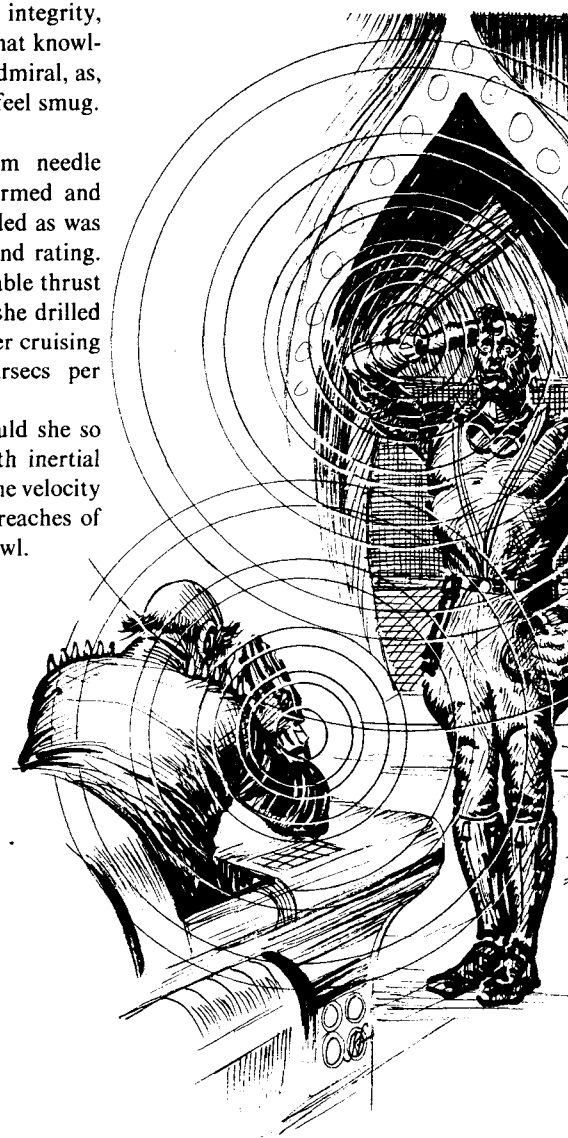
range, and kills any being besides its owner who attempts to wear it.

Thus, it is both pretty and useful.

Manufactured and issued by the mysterious beings of dread and dreaded Arisia, it cannot be counterfeited, and is given only to those entities of the highest honor, integrity, honesty, and intelligence. That knowledge made the Starboard Admiral, as, indeed, it did all Lensmen, feel smug.

The mighty *Dentless,* from needle prow to flaring jets, was armed and amored, screened and shielded as was no other ship of her class and rating. Under the almost inconceivable thrust of her mighty driving jets, she drilled a hole through the void at her cruising velocity of a hundred parsecs per hour.

Not in the inert state could she so have done, for no body with inertial mass can travel faster than the velocity of light, which, in the vast reaches of the galaxy, is the veriest crawl.



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But her Bergenholm, that intricate machine which renders a spaceship inertialess, or "free," permitted her to move at whatever velocity her ravening jets could achieve against the meager resistance of the almost perfect vacuum of interstellar space. Unfortunately, the Bergenholm, while it could completely neutralize *interial* mass, never quite knew what to do with *gravitational* mass, which seems to come and go as the circumstances require.

As the *Dentless* bored on through the awesome void toward her goal, Ginnison and Chief Firing Officer Flatworthy checked and rechecked her mighty armament. Hot and tight were her ravening primary beams, against which no material object, inert or free, can offer any resistance whatever. When struck by the irresistible torrents of energy from a primary, any form of matter, however hard, however resistant, however refractory, becomes, in a minute fraction of a second, an unimaginably hot cloud of totally ionized gases.

Equally tight, but not so hot, were the ultrapowerful secondaries, whose beams could liquify or gassify tungsten or even the ultraresistant neocarballoy in the blink of an eye.

The inspection over, Ginnison lit a cigarette with a tertiary and Lensed a thought to an entity in another part of the ship. "Woozle, old snake, I hate to disturb your contemplations, but could you come to my cabin? We have things to discuss."

"Immediately, Ginnison," that worthy replied, and shortly thereafter Ginnison's door opened and there entered a leather-winged, crocodile-headed, thirty-foot-long, crooked-armed, pythonish, reptillian nightmare. He draped himself across a couple of parallel bars, tied himself into a tasteful bowknot, and extended a few weirdly-stalked eyes. "Well?"

Ginnison looked affectionately at the horribly monstrous Lensman. "Concerning *l'affaire* Cadilax," he began.

"I know nothing about it, fortunately," Woozle interrupted. "That gives you a chance to explain everything."

"Very well, then. As you well know, I have spent a long time searching for clues that will lead me to the top echelon of Boskonia—Boskonia, that frightful, inimical, soul-destroying, intergalactic organization which is so ineradicably opposed to all the moral values which we of Civilization hold so dear."

Woozle closed a few eyes. "Yes. Continue."

"On Leanonabar," Ginnison continued, "I got a line through Banjo Freeko, the planetary dictator, but only after I blew up the mining industry on his planet and killed a few thousand innocent people—regretfully, of course. But I do that all the time. It

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revolts me, but I do it."

"What boots it?" Woozle asked. "You got your line, didn't you? You humans are *so* squeamish."

"To continue," said Ginnison. "This is the line I traced."

And in Woozle's mind there appeared a three-dimensional representation of intergalactic space. Two galaxies floated there in the awesome awfulness of the unimaginable vastness of the intergalactic void.

From Leanonabar, in the First, or Tellurian, Galaxy, a thin, hard red line ran straight through and past the Second Galaxy, out into the vast reaches of the intergalactic space beyond.

"Isn't that rather overdoing it?" came Woozle's thought. "You think this line may extend *beyond*—?"

Ginnison shook his head. "Not really. There's nothing along that line for half a billion parsecs, and that's a Seifert Galaxy."

"Tough about them," Woozle opined. "Let's get back to Cadilax."

"Oh, yes. Well, Cadilax is clear across the Galaxy from Leanonabar, so that should give us a good baseline for our second triangulation."

"I trust," Woozle thought, "that you have a better reason than that for picking Cadilax."

"Certainly." Rising from his seat, Ginnison paced across the deck of his cabin, turned, and paced back. "In the past several months, all hell has broken loose on Cadilax. The drug trade has gone up three hundred percent. Thionite, heroin, hashish, nitrolabe, cocaine, bentlam, and caffeine—all of them have increased tremendously, and Narcotics can't find the source. The adolescents have gone wild; the boys are wearing their hair long, and the girls have given up perms. Illicit sex is rampant. They live in unstructured social groups." He took a deep breath, and said, in a hushed voice: "There have even been demonstrations against the way the Patrol is running the Boskonian War!"

"Madness, indeed," Woozle agreed, "but are you certain that your information is up-to-date?"

"Reasonably certain," Ginnison pondered. "The latest information we have—"

At that point, a sharp, cold, Lensed thought intruded.

"Lensman Ginnison, greeting. I humbly request communication with you."

Ginnison recognized that thought. It was that of Shadrack, a poison-blooded, frigid-breathing Lensman he had known of yore.

"Sure, little chum; what is it?"

"I do not interrupt?" Shadrack quavered.

"Not at all. Go ahead."

"I trust I do not intrude upon matters of far greater importance than that of my own meager and faulty information?"

"Certainly not," Ginnison reassured.

"As is well known," continued the soft thought, "I am a yellow-bellied, chicken-livered, jelly-gutted coward—a racial characteristic which I cannot and do not deny. Therefore, I

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most humbly apologize for this unwarranted intrusion upon your thoughts."

"No need to overdo it, little chum," said Ginnison. "A simple grovel will be enough."

"Thank you, Ginnison," Shadrack sniveled gravely. "Then may I inquire, in my own small way, if you are aware of the existence of an entity known as Banlon of Downlo? He is, like myself, a creature accustomed to temperatures scarcely above zero absolute, but of far greater courage and bravery than any of my race possess."

"Banlon!" Ginnison's Lensed thought fairly shrieked. "Klono, yes, I know of him!" Then, more calmly: "He's been out after my hide since we destroyed Downlo."

"That, I fear, is true," Shadrack commented. "Even now, he has, according to the information which my poor powers have allowed me to glean, englobed the *Dentless* with a fleet of twelve ships which are prepared to blast you out of the ether."

"Klono's curving carballoy claws and gilded gadolinium gizzard!" Ginnison roared mentally. "Why didn't you say so in the first place?"

"I am devastated," Shadrack replied. "It is, again, a racial characteristic which I cannot avoid. It took me too long to apologize." A pause, then: "I fear, even now, that I may have been too late," Shadrack apologized. "Clear ether, Ginnison."

"Clear ether, little chum."

The Lensed connection cut off, and Ginnison flashed a thought to the control room, only to discover that, indeed, the *Dentless* was surrounded.

In a black, undetectable, refrigerated speedster, many parsecs from the soon-to-be scene of battle, that entity known as Banlon of Downlo gloated over his instruments as he watched the englobement of the *Dentless* take form.

Like the Meich, and like Shadrack, he was of a race whose normal temperature was near that of boiling helium, and thus required extradimensional extensions in order to gather enough energy to survive. Superficially, that sounds glib enough, but, unfortunately, your historian knows less about dimensional analysis than you do, so let's drop it right there.

To return to our narrative, Banlon, a safe distance away from the impending conflict, observed minutely the behavior of the Boskonian squadron which had englobed the *Dentless*. Each captain of the twelve Boskonian warships had done his job to perfection.

"Very well," Banlon radiated harshly to his minions, "englobement is now complete. Tractors and pressors on! Cut your Bergenholms and go inert! Blast that ship out of the ether!"

Inertialess as she was, the mighty *Dentless*, caught in a web of tractor and pressor beams, could not continue at speed against the resistance of an inert combined mass twelve times that of her own. Relative to the Boskonian squadron, she came to a dead halt in

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space, easy prey for the Boskonians.

At Banlon's order, all twelve Boskonian ships fired at once toward the center of their englobement, where the apparently helpless Patrol ship floated.

Beams, rods, cones, stilettoes, ice picks, corkscrews, knives, forks, and spoons of energy raved against the screens of the *Dentless*. Quasi-solid bolts of horrendous power chewed, gnawed, flared, snarled, and growled against the energy screens of the Patrol ship, seeking eagerly to blast through them to the hull metal. All of circumambient space was filled with the frightful discharge of those tremendous bolts of power.

The screens of the *Dentless* flared red, orange, yellow, green, blue, and into the violet. From there, they went into the ultraviolet and X-ray spectrum. But still they held.

Gimble Ginnison, teeth clenched and jaw muscles knotted, stared with unblinking gaze of gray eyes at the plate before him, listening to the reports from the officers commanding the various functions of the ship. But only one of those reports was really important.

"Screens holding, Lensman!"

"Fire secondaries!" the Lensman ordered crisply.

The prodigious might of the Patrol ship's secondaries flared out toward the twelve Boskonian ships. Those screens, too, blazed up the spectrum toward the ultraviolet, then toward blackness.

"Primaries one through twelve! Ready?"

"Ready, sir!"

"At my order, then." Ginnison watched his plate closely.

"Five seconds! Four . . . Three . . . Two . . . One . . . FIRE!"

Twelve primary batteries flamed forth as one, each ravening beam smashing into, through, and past the already weakened shields of the Boskonian battleships. Like tissue paper in the flame of an oxyhydrogen torch, the dozen ships dissolved into white-hot gas.

As far as his detectors could scan, Ginnison could see that there was not a single threat in the ether about the *Dentless*.

"Navigator," he ordered crisply, "continue toward Cadilax."

From his coign of vantage, so many parsecs away, Banlon stared in unbelief at his instruments, knowing to the full what they had reported. But after that first momentary shock, the ultrahard logic of his ultracold brain reasserted itself.

"Shit," he thought. And, flipping his speedster end-for-end, he turned around and ran.

Came, betimes, to Cadilax, a bum.

He showed up, unobtrusively, in the streets of Ardis, the capitol of that disturbed planet. He was, apparently, a man approaching sixty—graying, flabby, rheumy-eyed, alcoholic, and not too bright. He was so typical of his kind that no one noticed him; he was

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merely one of ten thousand such who wandered about the streets of the various cities of Cadilax. He hung around the bars and bistros of the spaceport, cadging drinks, begging for small change, leering innocuously at the hookers, and telling stories of the days of his youth, when he was "somebody." He claimed to have been a doctor, a lawyer, a pimp, a confidence man, a bartender, a judge, a police officer, a religious minister, and other such members of highly respected occupations, but he could never produce any proof that he had ever been any one of them.

And no one expected him to, for that was the *sine qua non* of the spaceport bum. He was what he was, and no one expected more of him. He called himself Goniff, and, because of his vaguely erudite manner of speech, soon became known as "Professor" Goniff.

He was never completely sober, and never completely drunk.

The student of this history has, of course, already surmised that beneath this guise lay the keen mind and brain of Gimble Ginnison, Gray Lensman, and he is right.

Throughout this time, Ginnison was searching out and finding a wight bedight Gauntluth.

It had taken time. The Gray Lensman's mind had probed into the depths of degradation, the valleys of vileness, the caverns of corruption, in the dregs of the noxious minds of the foulest folk of a planet before finding that name and that individual. He might have found him earlier, had he not been enjoying himself so much.

At first, only vaguely had he been able to construct from the clues available a picture of the all-powerful drug baron and pirate who ruthlessly ruled the underworld of Cadilax. Then, as time went on and more and more data came in, his visualization of Gauntluth became complete.

Gauntluth was tall, lean, and tough, with the all-prevading cadaverous blue of a Kalonian. His headquarters were in the Queen Ardis Hotel, the biggest luxury hotel on the planet, which catered only to the top fringe of the upper crust of the ultra-ultra.

There, in his superbly screened and shielded suite of offices, Gauntluth controlled, through an intricate webwork of communications, and by a highly efficiently-organized army of minions, the drug traffic of half a dozen solar systems.

For long Ginnison pondered, and came to the obvious conclusion that "Professor" Goniff could in no wise gain admission to the elite society of the Queen Ardis Hotel. Therefore Goniff the bum vanished.

Instead, it was Lester Q. Twodyce, cosmopolitan, and wealthy playboy, who checked into the Queen Ardis with an *entourage* of flunkies and yes-men, not one of whom could easily be detected as an officer of the Galactic Patrol. As was *de rigeur* on Cadilax, every one of Twodyce's men wore a thought-screen.

Carefully, step by step, Ginnison laid his trap. Through the highest

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ranks of Gauntluth's organization, it became known that Lester Q. Twodyce had something valuable that he was eager to sell. It became clear, even to Gauntluth, that whatever it was Twodyce had, it was certainly worth investigating.

Thus it came about that one evening, when the impeccably dressed Mr. Twodyce was seated at a table in the grand dining room of the hotel with two of his hard-faced gunmen, he was approached by two equally well-dressed men who bowed politely and smiled pleasantly.

One of them said: "Good evening, Mr. Twodyce. I trust we do not interrupt your repast?"

Twodyce looked up. "Not at all," he said. "Will you be seated?"

Then, almost as an afterthought: "May I order you drinks? Such distinguished men as yourselves deserve only the best, of course."

"You know, then, who we are?" asked the spokesman.

"Certainly, Mr. Thord," replied the Lensman suavely, "you and Mr. Thield are hardly anonymous." Drinks were brought.

"These—" he gestured toward the men on either side of him, "—are my associates, Mr. Kokomo and Mr. De Katur."

After several minutes of preliminary conversation, the ape-faced Thord finally broached the subject which they had all been anticipating.

"I hear, Mr. Twodyce," he said, "you are here to do business."

"Not primarily," said the Lensman nonchalantly. "I am here to enjoy myself. Business is not a primary concern of mine."

"I understand," said Thord, "for such a man as yourself . . ."

"Nevertheless," continued Ginnison, "I do have a small trifle which I am willing to dispose of for a proper price."

The lizardlike Mr. Thield spoke. "And that is?"

Twodyce said offhandedly, "Fifty grams of clear-quill thionite."

There was a stunned silence from Thord and Thield.

Thionite! Thionite, that dreadful and dreadfully expensive drug which, in microgram doses, induced in the user clear, three-dimensional, stereosonic visions in which he indulges in his every desire to the point of ecstasy. *Every* desire, base or noble, mental or physical, conscious or subconscious. Whatever pleasurable experience he wishes for himself, he experiences. It is addictive to the *n*th degree. It is the ultimate high, but the slightest overdose is deadly.

It is also purple.

One milligram of that dire drug was enough for a thousand doses, and the insouciant Mr. Twodyce was offering fifty thousand times that amount!

"Gad!" murmured Mr. Thield.

"Indeed?" said Thord. "If that is true, we are prepared to offer . . ."

"You will offer nothing," Ginnison said calmly. "I do not deal with underlings."

Thord's face darkened. "Underlings? *Underlings*? To whom do you

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think you are speaking, *Mister* Twodyce?"

"To underlings," said the unruffled Twodyce. "And you may tell Gauntluth I said so."

There was a momentary silence from Thord and Thield as their eyes darted from Ginnison's face to those of the bodyguards. Each was fingering his necktie, his right hand only inches away from the DeLameter that was undoubtedly in a shoulder holster concealed by the loose-fitting dress jacket that each man wore.

Thord and Thield rose, superficially regaining their composure. "We will speak to you later, Mr. Twodyce," said Thord.

"You will not," said Ginnison in a low, deadly voice. "I have no desire to see either of you again. Gauntluth may contact me if he so wishes. Tell Gauntluth that I caution him to think of a hamburger."

"A . . . a hamburger?" gasped Thord.

"Precisely. A hamburger."

"—But—"

"You may not be able to figure it out," Gunnison said coldly, "but your boss will. Now go."

Without another word, the two underlings turned and went.

That night, in his own suite, Lester Q. Twodyce was Lensing a thought to Lieutenant-Admiral Partisipple, the Lensman in charge of the Patrol base on Cadilax.

"Partisipple?"

"Yes, Ginnison, what is it?" came the Lensman-Admiral's thought.

"This thing's about to bust wide open," Ginnison declared, "and I'll need some help."

"Anything you want, Gray Lensman."

"Good. Can you get me about fifty logons?"

"Logons?" Lensed the base commander in astonishment. "LOGONS!"

There was reason for his astonishment, for the logon, or Cadiligian rateagle, is one of the nastiest, most vicious, and intractable beasts in the galaxy. Its warped mind is capable of containing but one emotion: HATRED! The Cadiligian rateagle hates anything and everything living, the only desire in the small compass of its mind being to reduce that life to something edible. The logon resembles the Tellurian rat at its worst, but it is the size of a Tellurian terrier and has the wings and claws of an eagle. Logons do not make nice pets.

"Yes, logons," Ginnison replied. "I can control them."

"With your superior mental equipment," the base commander thought humbly, "I am sure you can. How do you want them packaged?"

"Put them in a 'copter. Have the pilot ready to release them on my order, within one kilometer of the roof of the Queen Ardis Hotel."

"Certainly. Clear ether, Gray Lensman."

"Clear ether, Partisipple."

Then, another Lensed thought to Woozle, in the *Dentless*, hovering in-

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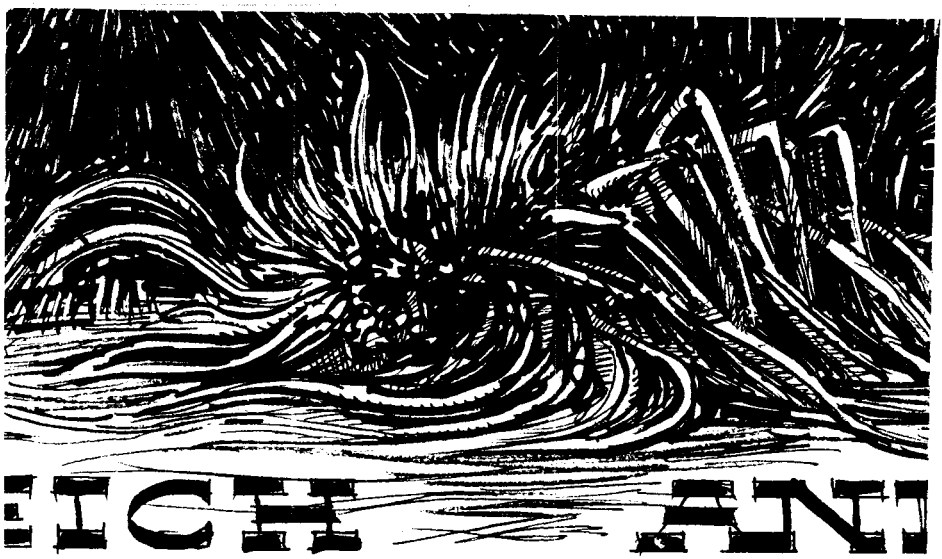

visibly in orbit high above the surface of Cadilax. "Woozle, old serpent, here's the story so far." And in flashing thoughts he told the reptilian Lensman his plans. "So have Lieutenant Hess von Baschenvolks and his company of Dutch Valerians down here and ready to go."

"Will do, Ginnison. Clear ether."

"Clear ether."

In the office on the top floor of the Queen Ardis Hotel, the inscrutable face of Gauntluth stared thoughtfully at the banks of screens, meters, switches, dials, indicators, knobs, buttons, and flickering lights on the panels and control boards which surrounded him.

Finally, after long pondering, he touched a button on one of his control panels. "Give me suite 3305," he said.

Ginnison was waiting for the call when it came. The cadaverous blue face of the gaunt Gauntluth appeared on his visiscreen. "Yes?" he said calmly.

"I am told," came Gauntluth's rasping voice, "that you are in a position to deal with me concerning a certain—ah—article."

"As long as the deal is on the up-and-up, I am," replied Ginnison. "Of course, the usual precautions must be taken on both sides."

"Of course, my dear fellow," Gauntluth said agreeably. "Shall we, then, make arrangements that are agreeable to both sides?"

"Let us do so," said Ginnison.

On cold and distant Jugavine, the planet of the Meich, the First of the frightful Council, Meichfrite, radiated harshly to the others: "You have all scanned the tapes containing the re-

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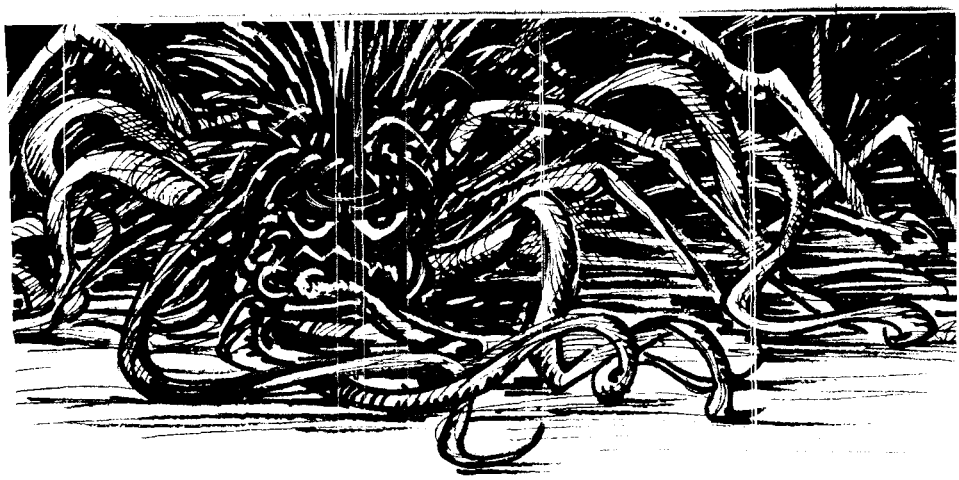

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port of our agent, Banlon of Downlo. Somehow, by what means we know not, the Lensman, Ginnison, escaped the trap Banlon set for him. Twelve of our ships have vanished utterly, and Banlon's report is neither complete nor conclusive. I would now like to hear your comments. Meichrobe."

"It seems to me," that worthy radiated, "that the strawberries are—"

"Forget the goddam strawberries!" Meichfrite riposted. *"What about Ginnison?"*

"Well, then," Meichrobe thought raspingly, "our computers have calculated that with a probability of point oh oh four, Gimble Ginnison has either gone to Cadilax or somewhere else."

"Indeed," Meichfrite thought thoughtfully. "Meichrodot, Fifth of the Meich, give us your thoughts on this subject."

"Our reports from Cadilax," informed Meichrodot, "indicate that all is going smoothly. There is no trace of the Lensman on or near the planet. However, Banlon's agent Gauntluth has reported through Banlon that he is running short of thionite. He wants to make a buy."

Meichfrite turned his attention to the Sixth of the Meich. "Meichroft, this is your department."

"Banlon," Meichroft emitted, "must go to Trenco."

Trenco! That planet was, and is, unique. Its atmosphere and its liquid are its two outstanding peculiarities. Half of the atmosphere and almost all of the liquid of the planet is a compound with an extremely low heat of vaporization. It has a boiling point such that during the day it is a vapor and it condenses to a liquid at night. The days are intensely hot, the nights intensely cold.

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The planet rotates on its axis in a little less than twenty-six hours; during the night it rains exactly forty-seven feet, five inches—no more and no less, every night of every year.

The winds are of more than hurricane velocity, rising to some eight hundred miles per hour, accompanied by blinding, almost continuous lightning discharges.

What makes the planet unique, however, is that, with compounds of such low latent heat, the energy transfer is almost nil. Theoretically, the hot days should evaporate that liquid as quietly and gently as a ghost evaporates in a spotlight, and during the night it should condense as softly as dew from heaven falling upon the place beneath. Thermodynamically speaking, the planet Trenco should be about as turbulent as a goldfish bowl. Nobody can figure out where those winds or the lightning come from.

Be that as it may, Trenco was, and is, the only planet where the plant known as Trenconian broadleaf grows, and that plant is the only source of thionite in any of several galaxies.

In addition, Trenco has a strong Galactic Patrol base, manned by Rigellian Patrolmen whose sole job it is to kill anyone who comes to Trenco. One can well understand why thionite was, and is, so expensive.

"Ah, a cogent thought indeed!" radiated Meichfrite. "Very well, then, relay to Banlon that he is to proceed at speed to Trenco and pick up a cargo of broadleaf, to bring here for processing. Meantime he is to order his underling Gauntluth to report directly to us."

In his office atop the Queen Ardis, Gauntluth the Kalonian watched with hard, steel-blue eyes as a figure on his spy-ray plate moved toward his suite of offices.

Twodyce, with the exception of the DeLameter in his shoulder holster, was unarmed; he was carrying nothing else but the hermetically sealed container which bore within itself fifty grams of almost impalpable purple powder.

A smile twisted Gauntluth's face. "Fool!" he gritted harshly under his breath.

He continued to watch as Twodyce came to the outer door and activated the announcer. He activated the door-opener. "Come in, Mr. Twodyce," he spoke into a microphone. "Down the hall and first door to your left."

Gimble Ginnison, fully alert, strode down the corridor and opened the door. Alone behind his desk sat the unsuspecting Kalonian.

"I perceive," said the zwilnik*, "that you have brought the thionite with you."

"I have," said the Lensman. "Have you the payment ready?"

"Certainly. Half in bar platinum, half in Patrol credits, as specified. But first, of course, I must test the thionite."

"First I test the platinum," said Twodyce impassively.

**A zwilnik is anyone connected with the drug trade.*

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Gauntluth blinked. "We seem to be at an impasse," he murmured. "However, I think I see a way around it. Know, Twodyce, that you stand now in the focus of a complex of robotic devices which, with rays and beams of tremendous power, will reduce you to a crisp unless you hand over that thionite container instantly."

"Since it is inevitable," Ginnison said calmly, "I might as well enjoy it." He carefully put the thionite container on Gauntluth's desk.

Gauntluth needed no further check. Directing his thought toward a lump of force in a nearby corner of the room, he sent a message to Jugavine.

This was the moment for which Ginnison had been waiting. In an instant, he effortlessly took over the zwilnik*'s mind. He allowed Gauntluth to send the message, since it would only further confuse all those concerned. Gauntluth reported in full to Meichfrite that he had, indeed, obtained a goodly supply of thionite.

"Excellent," the cold thought returned. "There will be more coming. End communication."

By main force and awkwardness, Ginnison held Gauntluth's mind in thrall. He now had his second line to the Boskonian base, but Gauntluth, although taken by surprise at first, was now fighting Ginnison's mental control with every mega-erg of his hard Kalonian mind.

"Think you can succeed, even now?" sneered the still-rigid Kalonian mentally. And, with a tremendous effort of will, he moved a pinkie a fraction of a millimeter to cover a photocell. Every alarm in the building went off.

Ginnison's mind clamped down instantly to paralyze the hapless zwilnik*. With a mirthless smile on his face, Ginnison said: "I permitted that as a gesture of futility. You did not, as I suggested, contemplate a hamburger."

"Bah!" came Gauntluth's thought. "That childishness?"

"Not childishness," said the Lensman coldly. "A hamburger is so constructed that most of the meat is hidden by the bun. My resources are far greater than those which appear around the edge."

A zwilnik is still a zwilnik.

See above.

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Then Ginnison invaded Gauntluth's mind and took every iota of relevant information therein, following which, he hurled a bolt of mental energy calculated to slay any living thing. Perforce, Gauntluth ceased to be a living thing.

Meanwhile, from a hidden and shielded barracks in a sub-basement of the Queen Ardis came a full squadron of armed and armored space-thugs, swarming up stairways and elevators to reach the late Gauntluth's suite. Closer, and, at this point in space and time, far more dangerous, were the DeLameter-armed, thought-screened executives and plug-uglies who were even now battering down the doors of the suite.

Calmly and with deliberation, Ginnison flashed a thought to Woozle: "HE-E-E-ELP!"

"At speed, Ginnison," came the reply.

Ginnison went into action. Snatching the hermetically sealed thionite container from the desk at which lay the cooling corpse of Gauntluth, he broke the seal and emptied the contents into the intake vent of the air conditioner. He had, of course, taken the precaution of putting antithionite plugs in his nostrils; all he had to do was to keep his mouth shut and he would be perfectly safe.

The impalpable purple powder permeated the atmosphere of the hotel. There was enough of the active principle of that deadly drug to turn on fifty million people; since the slightest overdose could kill, every person in the hotel not wearing antithionite plugs or space armor died in blissful ecstasy. Most of Gauntluth's thugs were wearing one or the other, but at least the Galactic Patrol need no longer worry about interference from innocent bystanders.

With lightning speed, Ginnison grabbed a heavy-caliber, water-cooled, machine rifle that just happened to be standing near Gauntluth's desk, swiveled it to face the doors of the office, and waited.

At the same moment, a borazon-hard, bronze-beryllium-steel-prowed landing craft smashed into the side of the Hotel Queen Ardis at the fifteenth floor. Steel griders, ferroconcrete walls, and brick facing alike splattered aside as that hard-driven, specially-designed space boat, hitting its reverse jets at the last second to bring it to a dead halt, slammed into and through the bridal suite. The port slammed open and from it leaped, strode, jumped and strutted a company of Dutch Valerians in full space armor, swinging their mighty thirty-pound space axes.

No bifurcate race, wherever situate, will voluntarily face a Valerian in battle. Those mighty warriors, bred in a gravitational field three times that of Tellus, have no ruth for any of Civilization's foes. The smallest Valerian could, in full armor, do a standing high jump of nearly fifteen feet in a field of one Tellurian gravity; he could feint, parry, lunge, swing, and duck with a speed utterly impossible for any

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of the lesser breeds of man. Like all jocks, they are not too bright.

Led by Lieutenant Hess von Baschenvolks, they charged in to block off the armed and armored space-thugs who were heading toward the top floor. As they charged in, the Lieutenant shouted their battle cry.

"Kill! Bash! Smash! Cut! Hack! Destroy! Bleed, you bastards! Bleed and die!" And, of course, they did.

A thirty-pound space ax driven by the muscles of a Valerian can cut its way through any armor. Heads fell; arms were lopped off; gallons of gore flowed over the expensive carpetry. Leaving behind them dozens of corpses, the Valerians charged upward, toward the suite of offices where the Gray Lensman awaited the assault of Gauntluth's men, fingers poised, ready to press the hair triggers of the heavy machine rifle.

The news of the attack, however, reached those winsome wights long before the Valerians did. They knew that, unarmored as they were, they stood no chance against those Patrolmen. They headed for the roof, where powerful 'copters awaited them for their getaway.

It was not until they were all on the roof that the logons, released from the special 'copter less than a kilometer away, and individually controlled by the mighty mind of Gimble Ginnison, launched their attack. The zwilnik* executives and plug-uglies had no chance. Only a few managed to draw and fire their ray guns, and even those few missed their targets. Within a space of seconds, the entire group had been slashed, cut, scratched, bitten, killed, and half-eaten by the winged horrors that had been released upon them.

*Forget it.

In Gauntluth's office, Ginnison waited behind the machine rifle, his fingers still poised on the hair-triggers. The door smashed and fell. But Ginnison recognized the bulky space-armored eight-foot figure that loomed before him. His hands came away from the triggers as he said: "Hi, Hess!"

"Duuuhh . . . Hi, Boss," said Lieutenant Hess von Baschenvolks.

In a totally black, intrinsically indetectable, ultrapowered speedster, towing three negaspheres of planetary antimass, Gimble Ginnison cautiously approached the hollow sphere of light-obliterating dust which surrounded the dread planet Jugavine of the Meich.

With his second line of communication, it had been a simple job to locate exactly and precisely the planet which had been the source of the disruption which had hit the planet Cadilax.

Further, that mental communication had given Ginnison all the information he needed to wipe out this pernicious pesthole of pediculous parasites on the body politic of Civilization.

The negaspheres were an integral part of the plan.

The negasphere was, and is, a complete negation of matter. To it, a push

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is, or becomes, a pull, and vice versa. No radiation of whatever kind can escape from or be reflected by its utterly black surface. It is dense beyond imagining; even a negasphere of planetary antimass is less than a kilometer in diameter. When a negasphere strikes ordinary matter, the two cancel out, bringing into being vast quantities of ultrahard and very deadly radiation. A negasphere is, by its very nature, inherently indetectable by any form of radar or spy-ray beam. Even extrasensory perception reels dizzyingly away from that vast infinitude of absolute negation.

Like the Bergenholm, the negasphere can never really make up its mind about gravity; gravity is, was, and always has been a pull, and it *should* act as a *push* against a negasphere; since it does not do so, we must conclude that there is something peculiar about the mathematics of the negasphere.

It is to Ginnison's credit that he had perceived this subtle, but inalterable, anomaly.

Into the hollow cloud of black interstellar dust that surrounded frigid Jugavine, there was but one entrance, and into that entrance the Gray Lensman's speedster, towing with tractors and pressors those three deadly negaspheres, wended its intricate way.

In his office, the Starboard Admiral glowered. "I don't like it. Ginnison should have taken the full fleet with him."

The personage he was addressing was Sir Houston Carbarn, the most brilliant mathematical physicist in the

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known universe. He was one of a handful of living entities who could actually think in the abstruse and abstract language of pure mathematics.

"I don't like his going in there alone," the Starboard Admiral continued. "If that hollow sphere of dust is as black and bleak as he says it is, he will have nothing to guide him but his sense of perception."

"$\text{DIV}\vec{B} = 0, \text{CURL}\vec{B} = je + \dfrac{\partial E}{\partial t}$

$\text{DIV}\vec{E} = Pe, \text{CURL}\vec{E} = 0 - \dfrac{\partial B}{\partial t}$,"

said Sir Houston Carbarn thoughtfully.

"True," agreed the Starboard Admiral, "but I can see no way for him to illuminate such a vast amount of space with the means at his command. That hollow globe is two parsecs across, and contains within it only a single solid body—the planet Jugavine. How can he possibly get enough illumination to find the planet?"

"$x^2 + y^2 + z^2 = r^2$," murmured Sir Houston, "$e = Mc^2$."

"Yes, yes, obviously!" snapped the Starboard Admiral, "but in order to illumine the interior of that hollow globe, he will have to find Jugavine first, and to do that he needs illumination. It seems to me this involves a paradox."

"$pq \neq qp$," Sir Houston snapped.

"Ah, I see what you mean," said the Starboard Admiral. "But what about Banlon of Downlo? According to Ginnison's report, Banlon is returning to Jugavine with a cargo of Trenconian broadleaf which he somehow managed to steal from under the very noses of Trigonometree, the Rigellian Lensman in charge of our base on Trenco. If Ginnison destroys Jugavine, Banlon's sense of perception will immediately tell him that the planet no longer exists, and he will not fall into Ginnison's trap. How is he going to get around that?"

"?" mused Sir Houston abstractedly.

Gimble Ginnison, Gray Lensman, had no need of slow, electromagnetic radiation to locate the planet of the Meich. His tremendous sense of perception had pinpointed that doomed planet exactly. Calculating carefully the intrinsic velocity of his first negasphere in relation to that of the planet of the Meich, he released that black, enigmatic ball of negation toward its hapless target.

The negasphere struck. Or perhaps not. Is it possible for nothing to strike anything? Let us say, then, that the negasphere began to occupy the same space as that of Jugavine. At the hyperdimensional surface of contact, the matter and antimatter mutually vanished. Where the negasphere struck, a huge hole appeared in that

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theretofore frigid planet. The planet collapsed in on itself, its very substance eaten away by the all-devouring negasphere. The radiation of that mutual annihilation wrought heated havoc upon the doomed planet. Helium boiled; hydrogen melted; nitrogen fizzed; and all fell collapsingly into the rapidly diminishing negasphere.

When the awful and awesome process had completed itself, there was nothing left. Thus perished the Meich.

When the process was completed, the Gray Lensman hurled his two remaining negaspheres toward the *exact same spot in space.*

Then he sat and waited for Banlon of Downlo.

Time passed. Ginnison, ever on the alert with his acute sense of perception, at last detected Banlon's speedster entering the globe of dust. Banlon could not detect, at that distance, the flare of radiation which had resulted from the destruction of Jugavine. That radiation, struggling along at the speed of light, would require years to reach the interior surface of the globe.

Ginnison, waiting like a cat at a mouse hole, pounced at the instant that Banlon entered the globe. One flash of a primary beam, and Banlon of Downlo was forced into the next plane of existence. He ceased to be, save as white-hot gas, spreading and dissipating its energy through a relatively small volume of space.

Immediately, Ginnison Lensed his report back to Prime Base, then made his way out of the hollow globe and back to the *Dentless.*

The Starboard Admiral frowned and looked up at Sir Houston Carbarn. "I'm afraid I still don't understand. After Jugavine was destroyed, Banlon, with his sense of perception, which is instantaneous and is not hampered by the velocity of light, should have detected the fact that the planet no longer existed. Why did he continue on in toward a nonexistent planet?"

Sir Houston Carbarn smiled. "$(-1)\,(-1) = +1$," he informed.

The Starboard Admiral slammed his palm on the desk. "Of course! The principle of the double negative! Two negaspheres made a posisphere! Banlon thought it was Jugavine! Our Gray Lensman has genius, Sir Houston!"

"!" agreed Sir Houston.

When Gimble Ginnison strode into his quarters aboard the *Dentless*, Woozle was waiting for him. "What now?" queried that sapient serpent.

"Now for a decent meal, Woozle." He activated a communicator. "Galley? Send up a two-inch-thick steak, rare. Mashed potatoes and gravy. And a quart of black coffee."

"Yes, sir," came the reply. "And what about dessert, sir?"

Ginnison sat down in his chair with a triumphant sigh of relief. "Now, at last," he said, "I can enjoy that for which I have waited so long."

"The strawberries, sir?"

"Exactly. The strawberries." ■

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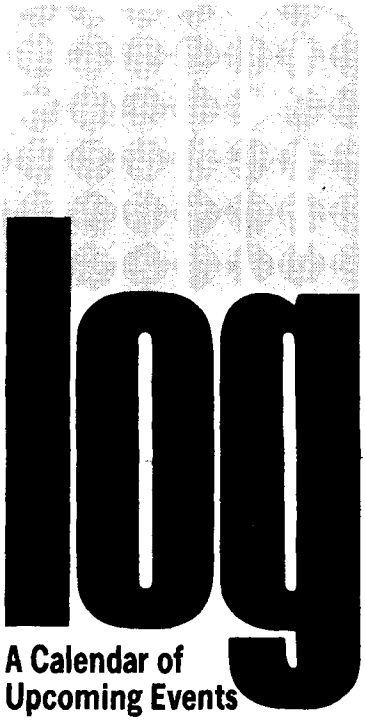

2-4 June
X-CON (Milwaukee area SF conference) at Holiday Inn Central, Milwaukee, WI. Guest of Honor—Anne McCaffrey, Fan Guest of Honor—Marty Coady. Registration $6 until 1 April, $8 thereafter. Info: X-Con, 2739 North Booth Street, Milwaukee WI 53212.

2-4 June
DEEPSOUTHCON (Annual Regional Southern SF conference) at Riviera Hyatt House, Atlanta, GA. Writer Guest of Honor—Clifford Simak. Artist Guest of Honor—Gahan Wilson. MC—Kelly Freas. Registration $7.50 until 1 June, $10.00 at the door. Info: Heritage Press, Box 721, Forest Park, GA 30050.

5-11 June
TROISIEME FESTIVAL INTERNATIONAL DE LA SCIENCE-FICTION, Hotel de Ville, 57000 Metz. Guest of Honor—Frank Herbert. For information, write to—Philippe R. Hupp, 7, rue Franchet d'Esperey, 57000 Montigny les Metz, France.

19 June—7 July
WRITING SCIENCE FICTION WORKSHOP. $10 registration fee, $55 per credit (one week). Director—George R. R. Martin, guests—Gene Wolfe, Gardner Dozois. For further information—Director of Summer Session, Clarke College, 1550 Clarke Drive, Dubuque, IA 52001, (319) 588-6354.

23-25 June
SECOND WORLD SCIENCE FICTION WRITERS CONFERENCE at Royal Marine Hotel, Dublin, Ireland. Founding meeting of World SF organization. Registration $6. Info: SF Horizons, 10 Fitzwilliam Square, Dublin 2, Ireland.

30 August—4 September 1978
IGUANACON (36th World Science Fiction Convention) at the Hyatt Regency, Phoenix, AZ. Guest of Honor—Harlan Ellison, Fan Guest of Honor—Bill Bowers, Toastmaster—F.M. Busby. Registration—supporting (Hugo voting and reports) $7, attending (all privileges) $20. This is the big one when all the SF family gather. Panels, talks, films, masquerade, art show, hucksters. The Hugo Awards and the John W. Campbell Award for Best New Writer will be presented. Selection is made by members of the convention so join and get a chance to vote. Info: Iguanacon, Box 1072, Phoenix AZ 85001.

ANTHONY R. LEWIS

Items for the Calendar should be sent to the Editorial Offices, ***four months*** *in advance of the issue in which you want the item to appear.*

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I was half asleep when the communicator, hearing my name called over and over, doubled it, then myself enough to answer it. It had a hard day, with a mines full of people to see to—and five people to teach—and a pilot to talk down.

I turned over as the voice stopped for a few moments. I would have gone right back to sleep, but—

My pile of bedsheets and blankets were whipped off, and I was promptly tossed out of bed, and onto the floor. I woke up then, but I was groggy. I got to my knees and started, "Oh, that was—" and stopped. Cinnamon was in her own apartment. That meant I'd been dumped by a telekinetic.

I reached up and thumbed the answer switch on the communicator.

"Whoever you are, that was a lousy trick. What's the time?"

"Three-thirty," the com said. "This is Fernando in the Tower, Kenzie. We need you up here."

I got up, aching. Stiff as a board, as usual. I'd been alerted before six the morning before, and hadn't gotten back to bed until after twelve. I started calisthenics to loosen up.

"What's the trouble?" I asked.

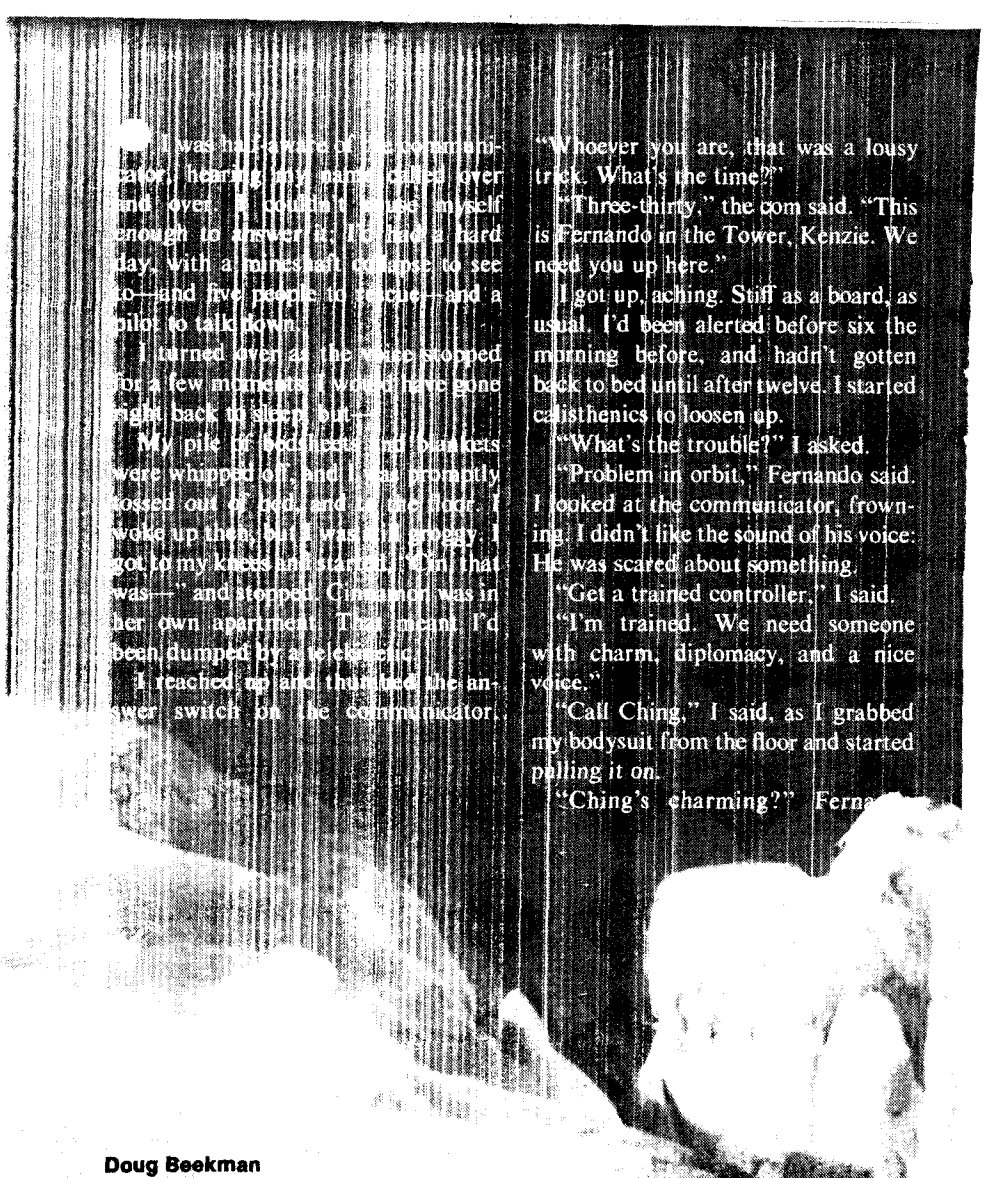
"Problem in orbit," Fernando said. I looked at the communicator, frowning. I didn't like the sound of his voice: He was scared about something.

"Get a trained controller," I said.

"I'm trained. We need someone with charm, diplomacy, and a nice voice."

"Call Ching," I said, as I grabbed my bodysuit from the floor and started pulling it on.

"Ching's charming?" Ferna



Doug Beekman

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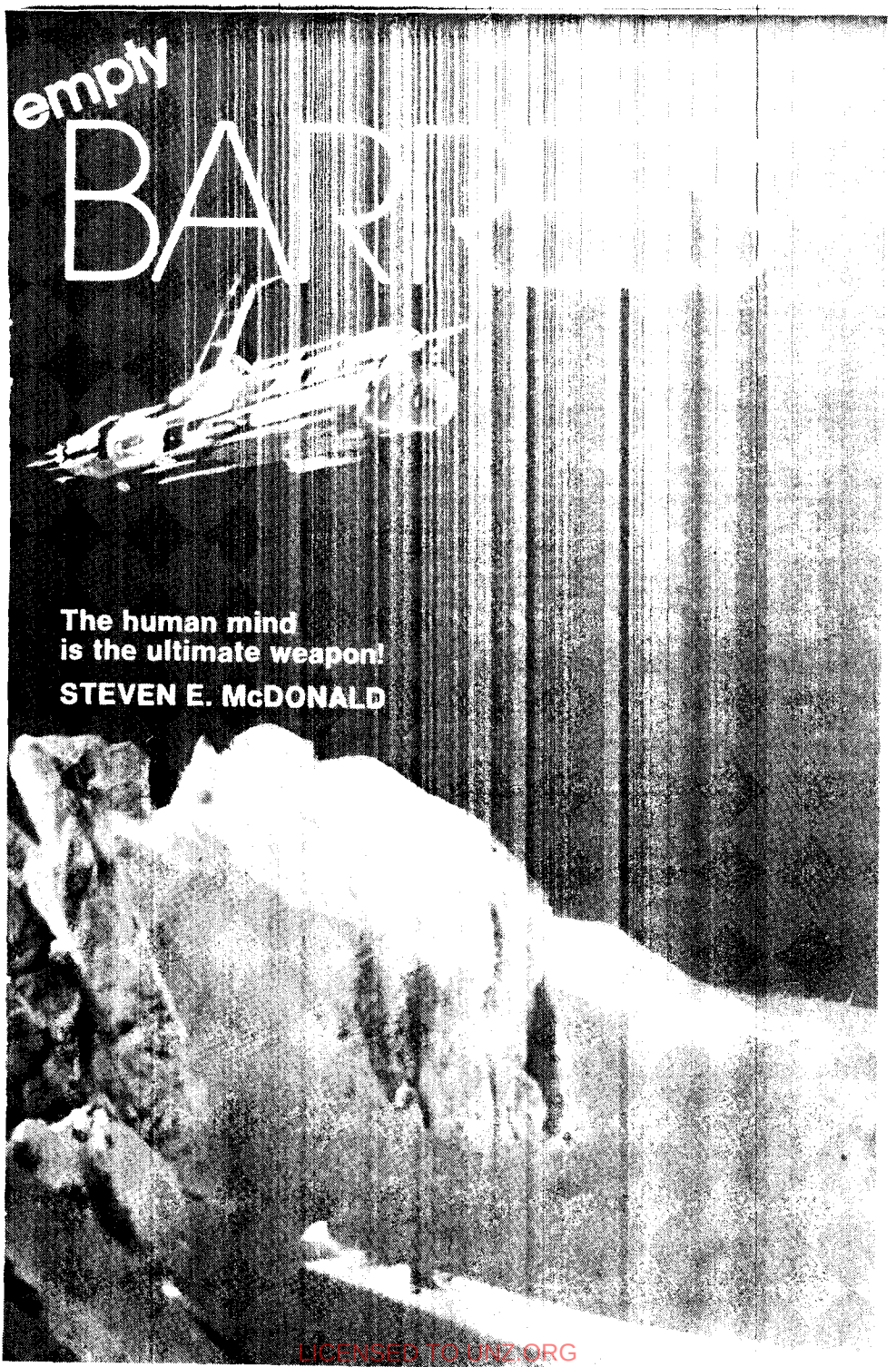

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paused, and I sealed the seam of the suit, checking the heaters. "No more jokes, Kenzie. Jo left a note for me to call you if I thought it was necessary. We've got a cruiser from New Stockbridge sitting over us."

I stopped dead, reaching for my furs.

"You're kidding, Fernando." I should have known something else would have to happen. First, the mines, then Ayna Parris's ship. Now this. No wonder Fernando was scared.

"I'm not." He was silent for a moment as I grabbed my furs and started pulling them on. "Kenzie, I'm worried. They won't tell me anything."

"I'm on my way," I said. "Ten minutes."

I switched the communicator off and finished pulling on my furs as I went to the door. Then I was outside and heading at a run for the skimmer garages. A minute later, I was on my way to Bertha's Tit, at top speed.

As worried as hell

Fernando was waiting for me on the Tit Tower elevator landing. His telekinetic had been at work again; the elevator hadn't waited for me to push buttons, but had started to move the second I was inside.

"Situation?" I said, as I came out of the cage.

"Unchanged." He moved up to my side and we ducked into the Tower control room together. We stopped in the center of the room while I stripped off one layer of fur.

Fernando pointed to a bank of screens over on console. "That's them. Coming in from number three."

"Uh-huh." Number three was one of our trio of comsats, sitting in a Clarke orbit around the other side of Snowball.

I trotted over to the screens. One of them held a slightly fuzzy view of the New Stockbridge cruiser, tubular and functionally ugly. It wasn't a lander.

I turned slightly and tossed the furs over the back of a chair. "Okay, what the hell's going on?"

"It's to do with our girl." I looked around, sharply, at him. I'd had to talk 'our girl'—Ayna Parris—down, earlier in the day. She'd been too tired to answer questions at the time. "From what they'll let me have, she's some kind of escaped criminal."

"She stole the ship she was flying," I pointed out. That much I'd gotten from the lady herself; it was most of the reason she had to be talked in.

Fernando nodded. "According to them it's a special Government prototype. They want it back."

I looked back at the New Stockbridge ship. "Let 'em build another. I can't see any reason why they'd chase her all the way here." I stepped back from the console and glanced around at other consoles. Most of the sensor and radar screens were lit, getting more use in one day than they'd had in the previous year. "They give any sort of reason?"

Fernando looked away from me and sighed. He was one of our older peo-

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ple—most of the people on Snowball are in their late teens, or not much beyond, which got us nicknamed 'Teenies' by assorted idiots who thought we were either kidding or stupid—in his early forties, and presently looking much older.

I could see why he was scared. A lot of us had been badly treated by Governments in our time, but Fernando had had it the worst. From New Stockbridge.

"Just 'information that cannot be disclosed'," he said, with a trace of anger. "Two things, in short. They want the ship and the girl given to them, or they'll come and get them. The other is that they want to speak to someone with authority."

I chewed my lower lip for a moment. "Sounds a bit like Lord Muck versus Lady Proper's virtue," I said, without feeling the humor in it. "Anything else?"

"The usual line about being a Federation-registered world." We weren't exactly friends with the Federation, but their system was loose enough to let us stick around without worries. Unfortunately, it also allowed New Stockbridge to stay around, and that was going to be a nuisance. "They said we're harboring a dangerous criminal and under colony law, etcetera."

I sat down, shaking my head. "You tell them we're a declared full world?"

"They won't take it. Stubborn bastards."

I swung my chair to look at Fernando. He was pacing up and down. "They still can't go throwing their weight around."

He stopped pacing and looked at me, grim. "Lay odds, Kenzie? They can claim we attacked them while they were in the process of upholding the law. We can't argue if we're nuked."

I turned away from him again, gritting my teeth, glaring out of one of the control room windows at the moonlit ice plains below. From the other side of the tower I would be able to see all the way back to the city. Number Two Son, our biggest moon, was up.

"Goddamn New Stockbridge," I muttered. "They won't be bluffing, either, will they?"

Fernando didn't answer. He knew New Stockbridge much better than I did; it gave him nightmares. The planet was a thorn in just about everyone's side. They insisted on keeping ready for a war, despite Federation insistence that it wasn't necessary. The Feds couldn't do anything about it—to try and stop it might just spark a war, with half the known galaxy on one side, and the other half backing the other. The neutrals would be caught in between. The Federation would need a damned good reason first.

Fernando was on Snowball because, like the rest of us, he was a mutant and a misfit. New Stockbridge had wanted to find out how to add his abilities to their armories—he was a pyropsychic, someone who could start fires and set off explosions by simply thinking about it. Some of the things they can do to a man's mind are terrifying;

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Fernando had barely escaped with a shred of sanity.

Twenty years later we found him in the asteroid colonies at Fomalhaut, an alcoholic wreck. A few more months and someone would have dumped him out of an airlock, without a suit.

And now, his devils were back, hanging over his head.

"You want to let someone else take over?" I asked, without looking around.

"I'll get by," he said.

I nodded, watching my dim reflection in the glass. "Fine."

As far as I could tell, we had a two-part choice. Give up the girl and hope New Stockbridge would leave us in peace. They might do, but if they had any idea of what we could do, they would try their best to cash in on it. The other part: Refuse to hand her over, and see what happened then. They could bomb us to soften us up, bomb us out completely, or drop troops. Troops we might be able to handle for a while. Bombs were another matter; we'd have no chance.

Simple enough. Do or die.

I said, "They aren't getting the girl."

That's exactly how simple.

Fernando said. "You could wait for a vote." He wasn't trying very hard to convince me.

"No. I'm after some time, first. I think a lot of people would agree with me."

"It's suicide, Kenzie."

I sighed and shrugged. "Might be if

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you don't try. I want to know what they're playing at up there." I swung my chair around again. "Besides, I've got the authority, which is why you called me."

Fernando nodded. "Your game. Want me to put you through now? They're waiting for your authority." He almost managed a grin. "I'll go join the others when you're through."

I shook my head. "Stick around."

While he went through the link-up procedure with the New Stockbridge ship's com officer, I watched the screens. Definitely a light cruiser, probably fully-armed with a wide range of weaponry. Lasers through fusion bombs, possibly even cobalt bombs at that. They'd have to use troop carriers for surface works, but they probably wouldn't bother. Just a few fast muscle-flexes and we would go under.

"Get ready," Fernando said, as he turned from his console. "You'll be talking to Lieutenant-Commander Belinski, addressed as Lieutenant. You won't like it."

"Why not?" He shook his head and flipped a switch, lighting up a section of the console I was sitting at. He said something into his own mike, then nodded at me.

"Lieutenant Commander Belinski for Kenzie Goodall of Snowball," an icy, smooth, female voice said, sharply. Contralto, making me think of coquettes, then of Cinnamon, then of Ching. I didn't have any idea why. This voice would have made a Snowman shiver. Authority, cold, and backed up by *Power*.

It scared the hell out of me.

I said, "This is Kenzie Goodall speaking."

"What authority do you represent?" *Click-clack*. Inhuman in style. I disliked this lady intensely.

"Snowball *in toto*," I said.

"I would prefer to speak with your chief elected official."

"Our chief elected official is presently indisposed and cannot deal with this matter," I said, stiffly.

"Why not?"

So it was going to be that type of conversation. The Voice of Authority scolding the kids who went playing in the wrong garden. As it was, I would have gladly handed the problem to Deke Rozakis, but this sort of thing was supposed to be part of my job.

"His wife," I said, "is in need of servicing."

"What are you talking about?"

Scratch one sarcastic remark and dump the rest. "What I'm trying to point out is that I'm empowered to deal with this, your complaint or whatever it is. That was why I was dragged out of bed at this stupid time in the morning." Literally dragged.

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I was beginning to get twitches in the region of my stomach. Nerves. I looked at Fernando, and he looked away.

"That is not important, Goodall," Belinski snapped. "This matter *is*. It is of the *utmost* importance, and I suggest that you pay attention and cooperate. You are harboring an escaped convict."

That I'd heard before. "What was she convicted of?"

A few seconds of silence, with the sizzle of FM static. Then: "We have already explained to your Tower man that we are not empowered to discuss the matter with you."

I scowled at the board and considered that for a moment. Time for a lie. "Then you're stuck. Ms. Parris has requested, and been granted, asylum. She's now considered part of Snowball. And we, just to make it clear, are protected as such under Federation edict. Unless we know what she's wanted—"

"She stole the ship she came here in."

Almost my words. So far, one lie, one bluff. Time to get droll about it.

"Do you have proof of that?" I asked.

"We are not empowered—"

"In that case, you've got nothing to give us for extradition proceedings. In short, no case and no authority to request us to hand her over. And you've definitely no authority to stay in orbit around Snowball, seeing as you've just been refused the right."

Silence again, for a long minute.

"We have authority as a Full World under Federation law. You have not been granted that status."

"Nor have we been refused it," I said. "Under Federation law, we're a probationary Full World, with the rights and powers of one, until the matter is decided on Sarum."

Silence again, then, harshly: "I am in command of a fully-armed warship. If this stupidness does not cease, and we do not receive custody of both the woman and the ship within thirty standard hours, we will take her by force. If we cause damage, it is your fault, not ours."

That was that. All bluffs called, all the hands played. That was New Stockbridge's way; never play with loaded guns—but it gave me a sudden idea.

I looked around at Fernando. He shook his head, watching me. He didn't want me to give in.

Poor Fernando. "In that case, Madame Belinski," I said, turning back to the board, "send an experienced pilot down to pick up your little playtoy, and one other man with him to take back your own boat. Any more than that and we'll take it as a sign of aggression and we'll have to talk about two ships."

"I very much doubt that. Also, I do not find your bravado amusing. We will prepare. You will do likewise."

I felt like saluting the board, but grinned instead. The butterflies were still in my stomach, but the ideas were coming together. They didn't make much sense yet, though.

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"Tell your men they'll be making a night landing and takeoff on solid ice. We don't have a proper landing strip yet." I looked around at Fernando. He stared back at me, coming to the disbelieving realization of what I was doing. "If they come in too fast, we'll catch 'em."

"Our pilots are expert enough, Mr. Goodall." I was surprised. Her voice had warmed up slightly now that the scolding was done with.

"That's nice to hear," I said. "The other man will have to take off again right away. We don't have a spare hangar, and your boat'll probably freeze solid after a couple of hours on the ice. Gets pretty cold down here at night. We'll put your other man up in the city while we wrap up proceedings."

"I trust our prisoner will be ready."

"I'll handle it myself. Give me a couple of hours. You'll be able to go right back home tomorrow, as soon as your man checks out the ship and gives a go-ahead. You've got everything needed to check it over?"

"We have." No give-away there. I couldn't tell if I'd made any impression.

"That's it, then. Sorry to be troublesome."

"Good. Good-bye." *That* actually sounded human.

I cut the channel from my console and swung my seat around to look at Fernando. He was staring at me, still, shaking his head, his mouth open. Shock.

"Kenzie . . .?"

I shrugged. "Changed my mind. Decided I didn't want to be bombed out. I'm only human, Ferdie. Cowardly, but human."

He allowed consternation to show before he could do anything about it. "I don't understand you. One minute you're ready to hang on until they shoot and the next you're turning into a Judas." The words came out too rapidly.

"There's a little of it in everyone." I stood and picked up my furs, pulling them on. "I'm going back to the city. I've got things to do. Turn the beacon on and call me when they get here."

He came to his feet, striding toward me, a finger aimed at my nose, shaking. "Just a second, you—"

"Call me Kenzie, I prefer it."

He stopped, a few meters in front of me. "I don't give a *damn*! You just can't give in like that!"

"I just did. Look, what do we do? Throw sugar cookies at 'em? I'm in control here, Ferdie, Deke notwithstanding. It's done."

"I won't be party to it. They'll kill her, Kenzie, that's what they want her for. I know them! *You* know what they did to me!" He was cracking. I got ready to hit him with a knockout belt to his conscious area, but stopped myself from delivering it when he took a deep breath, appearing to regain control. "If you walk out of here, I'm going too. That's it. And the rest will go with me."

"Turn the beacon on and shut your mouth," I said. "Please?"

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"*No*!" he yelled. His face was reddening.

I got ready again. "Turn the bloody beacon on," I said, warningly. "Or I'll do it for you and *over* you. *Now*."

He knew what I meant, and his face changed, in puzzlement. "You can't do it, Kenzie. It's insane."

"Do we have a choice? That's a warship up there." I pointed at the ceiling. "We don't stand a chance." I was wondering, at the same time, what would happen if Fernando cracked. One blast and I would be ash.

"So let them have the ship." His voice had taken on a pleading tone. "Just don't give them the girl. It'd be murder, Kenzie. I know it would. So do you, I'm sure you do."

I waited him out for a few moments, then sighed. "Just turn the beacon on and quit bitching. Otherwise we're going to get more trouble than we've got already."

"You think they're going to leave us alone after this?"

I didn't say anything. He stared at me for a moment longer, then sighed and went to another console. I relaxed. He hesitated for a moment, then flicked a series of switches. Then he leaned on the console, and looked back at me.

"You bastard," he muttered.

"Heigh-ho for the society," I said. "Just don't panic. There's a lot to lose on our side." I started for the door, then turned, looking backwards. "Think about that, Ferdie."

The door opened and I stepped onto the elevator platform.

"Kenzie?"

I caught the door as it started to close. "Yeah?"

"You're planning something."

I grinned and raised an eyebrow. "Planning?"

He stood up from the console. "You've got that look about you."

"I might be. You never know."

I stepped back and let the door close before he could say anything else.

I drove around on the ice for thirty minutes, trying to formulate something from the few hazy ideas I had. I could have tried to stall for time directly, but I'd been thinking that Belinski wouldn't have bought the ploy right then.

The few ideas I had were typically wild, and more than a little frightening. And they were only stalling devices; we could take the thirty hours just planning, and all I had was an empty head.

It didn't take long to narrow things down to a conclusion. I needed extra brainpower. I couldn't take this outside of a small group either—panic was a possibility, even on Snowball—and if I took it to Deke, it would simply waste time. He'd only been elected colony chief because he bitched about other chiefs all the time. His main job was watching paperwork shuffling back and forth.

Point one was that we couldn't let Belinski have Ayna Parris; Fernando had been right about my knowing that the only reason New Stockbridge would send a ship after someone like

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Ayna was to kill her. So she might know something, and that started an unsettling train of thought. If she was supposed to know something, then we might know what she knew, according to New Stockbridge's lights, and that meant we'd have to be controlled too. Which meant that we'd have to come full circle again: To Ayna. Nobody steals a ship they know nothing about—and talking her down had proven that well enough—unless they're running from something. And I'd heard the fear in her voice when she was coming in. There's something that draws you close to somebody else scared, after you get to know the feeling. And I knew it, too well.

New Stockbridge was welcome to the ship, if that was the main cause of our troubles.

Decision made. Stand and fight, if possible. There had to be a way to do it.

I tapped out Cinnamon's personal code on the snow skimmer's com panel. The lady would be mighty unhappy, but that was too bad. I needed her help. And some coffee.

"Shake your feathers, girlie," I said. "This is your morning wake-up call."

"It's just after four, Kenzie," Cinnamon's sleepy voice said, a moment later.

"I know. Out of bed. We've got a problem."

"Can I go back to sleep and let you tell me later?"

"Sorry love."

"Thank you."

"I didn't say you could go back to sleep, Cin," I said, quickly. "We're in trouble and I need some help. Otherwise we'll probably get blown to bits."

"You've been around Ching again. That sounds like a line—"

"I have not been around Ching," I said sharply. "I'm on my way back from the Tit. There's a cruiser from New Stockbridge over our heads, issuing threats and demands. They've come for Ayna Parris and her stolen ship."

"What do I have to do?" she asked, suddenly sounding wide awake.

"Get dressed, get coffee ready, then call whoever's looking after the lady. Wake her up, scream her if you have to." That was Cinnamon's talent; she was something of a telesend—but her main sending was much too loud. She could also set up a mental static field. Irritated most telepaths she came into contact with when she arrived on Snowball. "Get hold of Candi and Mitch and tell 'em to get ready for a monitoring session on the Parris lady. I want some decent answers. I'll reach you in five minutes or so." I swung the skimmer around to head at the city.

"What time did they get *you* out of bed?"

"Three-thirty. No chance for coffee. That's why I want some. While you're at it, try and think up a method for beating a light cruiser without weapons."

"That's easy. We can't."

"That's what I thought. Somebody is going to hate me after all this. Out."

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I pushed the accelerator pedal all the way down.

There was an idea nagging at me when I reached Cinnamon's apartment, but I couldn't get a grip on it, although it had been nagging since I'd parked the skimmer. I'd probably get a grip on it if I ignored it for a while, which was a problem. It was hard.

I grabbed hold of Cinnamon, who'd jumped into a flight suit for some reason, ruffled her red hair, kissed her, and bear-hugged her through my furs.

"You weren't thinking about what you were doing," she complained.

"My problem," I said, "and thinking about it." I was sure that the rough plan I'd sketched out wasn't quite right.

She pouted. "You could have put it aside for fifteen seconds."

"Won't stay put, not even for you." I glanced around. Everything in place, strewn about. We might be without luxuries, but some of us could make homes out of caves simply by dropping things around. "Coffee, lover, then off to work."

Cinnamon nodded and brushed hair out of her eyes as she went into the kitchenette. She came back with a coffeepot and two cups. Our coffee was homegrown, from a hybrid plant brought with us. It was one of the few things that could survive on Snowball proper, apart from Snowball's own flora and fauna. We had a few animals, plus hydroponics, and no more funds. And until we got some, we couldn't buy the biological material we needed to form other hybrids. The coffee itself was grown down in disused mine tunnels, and it thrived happily with decent lighting. It had been one of those tunnels that had come down, killing a technician and trapping another five. My job had been to rush telekinetics there to get rid of rubble and to shore the tunnel up until we could pull the trapped people out. Easy enough, but exhausting.

Cinnamon handed me a cup, then perched herself on the edge of a table, looking at me for a few moments.

"Okay," she said. "Explain it. You look worried half to death and being funny doesn't help at all."

I nodded, sipped the coffee, and explained things in as few words as I could. In between questions I finished the coffee. When the words tuckered out, she nodded.

"You're in the sticky. You give up Ayna and the ship, and we may still have to deal with New Stockbridge. Do a turnaround, and you get us all killed."

"Essentially that. I'm hoping to be able to play for some time to work up a good idea. Hopefully, they won't bomb us out of spite . . ."

"How? They've got all the weapons."

"We've got charm." I smiled. "Haven't we?"

Her face creased into a wry smile. "I recognize that tone, Kenzie Goodall. What are you thinking up for me to do?"

I told her. By the time I finished,

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she almost had a stitch from laughing.

"That's insane," she said, when she sobered up.

"But effective. I hope." I handed her my cup. "Refill, then to work. We don't have much time before the Stockbridge folks land."

She took the cup and refilled it, shaking her head and snorting. As she handed it back, she said, "I sent Candi to fetch Mitch. She woke Mitch up, so I didn't have to scream. They should be in Deke's office by now."

I drained the cup, quickly. "Good enough. Let's go."

We got.

We took one of the corridors that connect the various bubbles that make up the city's surface level. It was the shortest route to Deke's office—that was the best place, as Cinnamon had realized it seemed, for an interview. There wasn't much in the way of traffic at this time in the morning. We only passed one other person, one of the cleaning staff, and he didn't notice us, having his attention on a mini-viewer, watching something he found interesting in Ching's TV programming, although I couldn't think of anything that would require that much attention.

In the meantime, he was continuing his work, absently. A few meters behind him, a mop slopped from side to side, its bucket following its progress obediently, jerking along from time to time. Soap-sponges worked on the walls, drying sponges trailing them, while a cloth dusted the light panels in the ceiling, hopping from one to the next as we passed under it. It was spectacular enough, but all perfectly normal. However, I never ceased to be fascinated by it. In comparison, my own mind-blast ability

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was like a sledgehammer against a surgical microlaser.

Our two telepaths and our visitor were waiting for us in the office. Candi had propped her two-meter-ten-centimeter frame on the edge of Deke's battered desk—like most furniture in the city, it had been bought secondhand, for a low price—her frizzy black hair looking more than usually rumpled. Mitch, short for Michelina, was sitting in Deke's swivel chair, her feet up on the desk, barely reaching.

Ayna Parris sat, slumped, in one of the office chairs. As we walked in, she half-stood, and turned. She wasn't much taller than Mitch, probably around one meter sixty-five, black, with some oriental traces—especially denoted in her long, sleek, black hair. She was pretty—cute, even—but tired. Hell of a time to wake anybody up.

"Morning, Ayna," I said, airily.

She looked at me for a moment, almost in disbelief. "Hello," she said, finally. She probably thought she was in for an interrogation, New Stockbridge style.

Well, she wasn't too far out if so.

I grinned. "I'm the guy from Hooker-A who helped you get down in one piece." We'd had to catch her before she went off the end of the runway; for that we'd used three Hookers, souped-up skimmers that fired harpoons to drag the ship to a stop.

Ayna nodded and sucked at her lower lip, frowning for a moment.

"My name's Kenzie Goodall," I added. "This is Cinnamon, and you've already met Mitch and Candi."

"Yes."

I managed to prevent myself from tapping my foot on the flooring, with an effort. "You're a bundle of bloody trouble, m'love."

She started sniffing then, and her face wound up.

"But nothing we can't solve one way or another," I said, hastily. I looked at Mitch and jerked my head. "Ass out of that seat, youth, before I schedule a snow-roll for you. Get some coffee and something to eat for all of us."

"Yes *sir*, as you order, demand, command, etcetera." She swung up out of the chair, went around the desk, stopping briefly to glare defiantly up at Candi, who looked silently back down at her, then stalked past me, and out.

"You offended her dignity again," Candi said, her normally deep-throated voice ringing with amusement.

"I'll offend more than her dignity one of these days." I walked across the office and hefted a chair, carrying it back to the desk, placing it so I had a view of both Ayna and Candi. "Cin, you take Deke's seat and put your feet up. Candi, you link with Mitch and let her know the salient details, whatever, while she's sorting things."

Ayna had stopped sniffing and had wound down a little by now. I watched her for a few seconds, then nodded.

"I'd like to know what you're running from," I said, "because, right now, we've got a light cruiser from New Stockbridge sitting over our

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heads, making threats about what they'll do if we don't hand you over to them promptly."

I ran off the story in essentially the same detail as I'd given it to Cinnamon. Candi's eyebrows rose a couple of times, and she winced, painfully, a few times. This sort of situation plays hell with telepaths, especially when emotions run high—fear and depression being the worst two. From what I could see, Candi was getting both in liberal quantities.

Ayna was crumbling visibly, controlwise, by the time I finished, and the tears were streaming freely.

Right on cue, Mitch turned up with the coffee and food. I waved to Cinnamon, pointed at Ayna with my thumb, got a nod, grabbed a sandwich and a cup of coffee, and jerked my head for Candi to follow me outside. She trailed after me as soon as she'd picked up a cup and a sandwich.

As soon as the door closed, I said, "What's your opinion so far?"

Candi's dark face creased in thought. "I'd say she was damn near scared to death. I got some flashes, but they were pretty confused."

I nodded. "Uh-huh. Anything you can trace for sure?"

She closed her eyes for a moment. "Something or someone trying to hurt . . . no, trying to *kill* her. Absolute panic. I don't think she thought about which ship she was running off with."

"I knew that already." I sipped the coffee. Red hot. "Mitch getting anything?"

Candi shook her head. "Too confused right now. Cinnamon's trying to calm her."

"Anything as to why they bothered to chase her so far? The ship's one thing, but she seems to be just a mixed up lady who ran off with the wrong craft. I don't understand why they want her as well, or why they'd risk an incident like this to get her."

Candi bit into her sandwich, thoughtfully, then slowly nodded. "Her family keeps coming up, with extreme despair. Not worry. That's the strange thing. I'd have thought she would be worried about her family."

"Could be why she's running."

"I think it is. If they tried to kill her, it could mean they've already killed her family, or part of it."

I twisted my face around a bit, thinking about it. "From what I know about New Stockbridge, it's probable."

Candi nodded. "If they killed her family for some reason, it could mean she knows something that could hurt them. Or possibly something about the ship."

"Or that's what they think. I don't know, Candi. It still seems pointless to me. . . ." I looked at my sandwich, then took a chunk from it. Lettuce and tomato. Mitch must have made them from whatever was at hand. No salt and pepper. "What about war?"

Candi gave me a puzzled look. "You think New Stockbridge is planning a war? It isn't reasonable, Ken. Too much trouble. They might as well settle a new system—there

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are plenty of empty planets around."

"Don't talk about reason in the same sentence as humanity, sweetheart." I gave the idea some thought. "The thing that bugs me is that you're right. It would be too much trouble to start a fight over planets . . . I don't know. How's Ayna?"

"Getting calmer. Cinnamon's doing all right. And Mitch is doing her funny act, breaking through." She smiled. "She's even doing something new, dammit."

I nodded. We stood in silence for a half-minute, thinking hard.

Then we both stopped in mid-sip of coffee, and looked at each other. Candi's eyes seemed as surprised as mine felt.

I spluttered, choking for a moment. Then we both said it together.

"Federation!"

I nearly dropped my cup. "Oh my God," I wheezed.

Candi took a deep breath. "Another wild idea, Kenzie."

I shook my head. "I don't know. What would New Stockbridge gain from crippling the Federation at the center? If they knocked out both Sira and Sarum?"

Candi's face creased as she thought about it. "Power?"

I shook my head. "Not necessarily, Candi. They don't have to take over Sira and Sarum. Just hit both places hard enough to wipe out everything. Nothing subtle. That cuts off Federation protection across the whole system. The Fed ships wouldn't have a chance without warnings or reinforcements, or supplies. Also, it cuts lines of communication. There'd be no organized resistance to a takeover by New Stockbridge—in fact, half the places probably wouldn't realize they were being taken over until it was done with." I took a deep breath. "They don't even have to do the job all in one shot. All they'd have to do is move in on each system, make the takeover, add to the fleet, move on to the next one. If they don't hit the Feds first, they'll start a full-scale war in this arm. All it'd take is one ship to get to the Feds on Sira or Sarum. Lines of communication, remember? It's that or have a Fed fleet plus half the known galaxy kicking New Stockbridge around."

Candi looked horrified and pained, probably at the images my mind was conjuring up, if she was monitoring still. "If that's what they're up to, then Ayna must have been involved with it in some way."

I shook my head again. "I don't know about that. Somebody in her family, yes. Probably someone who didn't like the idea and wanted to get it out. If he got caught with the proof in hand, that'd be plenty of reason to do a knockout job on the whole family, on the off chance, involvement or no."

"Which means we don't have proof to show to the Federation people."

I pointed at the ceiling, and, automatically, she looked up, her hair falling past her broad shoulders with a rustle.

"Yes we do," I said.

"No we don't," she said, looking

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back down at me. "How do you propose to capture a light cruiser with ten passenger ships, a cargo barge, and a ship you know nothing about?" Candi had just summed up our total fleet and, silently, spelled out the fact that it wasn't much good against the cruiser.

I gave her my sneaky-candidate smile and winked. "Where there's a will there's a winner, Candi."

She nodded, ruefully. "And empty barrels make the most noise, Kenzie."

"It's race memory, sweets, just race memory. You're hearing jungle drums again." I drained my cup and waved at the door. "Back to work, beautiful."

"Flatterer, flatterer." Then she surprised me by bending down, gracefully, from her Valhallan height, and planting a motherly kiss on my forehead. "Thank you."

I raised an eyebrow. "Don't let Cinnamon catch you. I don't want her beaten to a pulp just yet."

I touched the doorswitch and gave her backside a hefty whack as the door opened. I followed her inside and waved my coffee cup in Mitch's direction. "More of that lousy coffee, please, Mitch."

"There goes her dignity again," Candi said.

"The hell with her dignity. We've got work to do."

The interview didn't tell us anything more than we already knew, or had worked out. She hadn't known which ship she was stealing, although the instrumentation had been set up a little differently from normal. She didn't start having problems with it until she was halfway out of the system—she'd been flying manual up until then. She'd finally locked it onto course for Snowball, in a more-or-less random choice. She hadn't had much chance to sleep since then, with one thing and another, and had been almost hysterical when she reached us.

Yes, she was running from the government, and no, she didn't know why they were chasing her, and yes, her family had been murdered, one by one. That was why she was running.

Then she broke down again. End of session. And all we had were a few fragments and some wild guesses. Logical enough, but, as Candi had pointed out, the proof was out in space and would be hell to get hold of.

I told Cinnamon to look after Ayna, then to join me in the Coffeebar down in the city. Then I waved to Candi to follow me.

As we started down toward the Coffeebar, I said, "So we're still stuck for facts."

"Looks like it. We've got a little."

"Pick up anything new?" I asked.

She shook her head. "Nothing. Just what she was thinking about at the time."

Something else had been upfront in my mind for a while. "What about the computer on the ship she swiped? From the trouble she had with navigation and landing, the computers are up to their ears in bar codes."

" 'Ears'?"

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"Metaphor."

"Oh. Could be something, do you think? This man coming in—the one who will be flying the ship back . . . do you think he might be carrying the release codes?"

I nodded. "I think so. Probably in his head." I kicked it around for a minute, in my head. "That's something." I explained my idea to her, as I had with Cinnamon. Candi laughed, but not so loudly, or as long.

"It could work," she said. "Just."

"Think you can amplify Cin's screamer and get enough bounce on it to jag our buddies upstairs?"

She nodded, briskly. "I can link with Mitch and Modesty. In fact, I think I can probably wake up the whole city and have them running fit to kill."

"The more noise the better."

She smiled. "Empty barrels."

"Your jungle drums again." I almost walked past the entrance to the Coffeebar. It's our substitute for alcohol distribution until we build facilities for processing the proper materials, and can grow the materials. It's a community hangdive for lonely hearts and chatty souls, nice and warm. Right now, it was empty and quiet.

"That's the whole point of jungle drums, Kenzie," Candi said, as she followed me inside. "It's a method of communicating a specific item over a distance. Electronic methods are only a better jungle drum."

"And telepathy?" I asked, as I picked up the ready-heated coffeepot.

"Another improvement, over electronics." She passed me two cups, and I filled them. "On a better scale, too. One to one, or one to many, without needing specialized equipment. You can send a happy birthday or set off a mass panic."

I lifted my coffee cup and stared over the rim of it. I had a heartening view of Candi's bust, which, naturally, was in proportion to the rest of her. "Only if the people you're trying to panic are sensitive enough."

"If it's loud enough it can be done." She swallowed her coffee in one great gulp. "It's only a matter of amplification."

"Or resonance?"

"Which brings us back to empty barrels."

"Full circle to an endless chain of nothings?" I said.

"There might be something in it, somewhere. It really depends on your interpretation, doesn't it?" She regarded me with a smugly amused look.

"If it was possible, I'd put you over my knee and paste your nether end for you," I said. "Are you trying to put it over that I'm empty-headed?"

"You're certainly noisy, Kenzie."

"Pass. Next problem?"

She started to say something, and then stared off into space for a moment.

She looked down at me, again. "That was the Tit onto Cinnamon. The New Stockbridge lander just touched down on the strip."

I checked my belt. No communicator, dammit. I finished my coffee.

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"Pass it on that I'll meet her down at her place, both skimmers. The plan will have to go as it is." I put the cup back on the bar. "You'd better link with someone on the strip yourself about the drug business."

I started out of the Coffeebar, wheeling back around for a moment. "And get Mitch and Modesty ready, and anyone else you can grab. The highest bounce you can hit, and segment it if you can, amplify the pertinent emotions."

"Fear and desperation, I think," Candi said, as she poured herself another cup of coffee.

"As you see fit. As long as it's effective."

Then I was out and running for my skimmer.

A skimmer was pulling away from the New Stockbridge lander when I reached the strip. I steered to run parallel and hailed him CQ. Cinnamon would be in the passenger hall by now, waiting. She was to play hostess to whomever Belinski had sent.

"Got you, Kenzie." the skimmer driver called back. "On four."

"Channel four," I acknowledged, as I locked it in. "How's Our Guy?"

"Our Guy is fine, just headed for immunization and checkout. Will process his papers and record it."

"Got you."

"Our Guy, by the by, is named Control Corporal First Class Marcus Payge, and has full authority to take charge of both the prisoner and the ship."

"Got you again. Put him through. Their ship on turnaround?"

"As said. Lift in ten minutes. He's on routine check and taxi and he'll start from top end."

"Got you. Check?"

"Double check. Clean sweep."

Good enough. Nobody but the chickens on board, no shock troops. So they'd taken enough of what I'd said to their cuddly hearts.

"Got you, Pickup. I'll check through with him. Cinnamon'll play hostess on the way back."

"Got you, Kenzie. Where'll you be?"

"Got business. I'll be around the strip for a while, then I'll go back to the city and catch the sleep Tower stole from me."

"Babyface, babyface."

"You watch your mouth, you hear?" I grinned and signed off. We were now off and running, and if nothing tripped us, we were partway home with the goodies.

I parked outside the terminal building, checked my furs, then followed the pickup and Payge through the lock and into the building.

The check-in crew were at work immediately, at the far end of the hall. They were mostly people dragged from around the strip, or pulled off the Tit. Including those with more esoteric functions than passport control.

I hand-signaled the woman at the end of the group, and got a signal in return. All smooth so far; no problems with finicky papers or Diplomat Sta-

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tus. That last was lucky for me. It put CC 1st Class Payge under whatever laws we cared to dream up.

They okayed him, then had him roll up his left sleeve for an immunization test. A totally unnecessary test—Snowball had nothing infectious to speak of, apart from what we'd brought with us.

From now on, Payge would grow steadily worse in temperament. The particular drug given him would induce mild schizophrenia, with depression. The choice of drug was Candi's, as she had a background in psychology.

My only worries were for Cinnamon, as the rest was up to her.

I watched Payge scoop up his briefcase—we didn't bother him with a customs search—and nodded to the same woman at the end of the group, Tonia Fleming. She started toward me, with a bouncy stride, as Payge left. She looked efficient, and happy, both of which were true.

She stopped in front of me. "Scanned him head to toe," she said, brightly. "One middle-sized handgun at the back of his pants, a needle-spitter in an ankle holster, and a medium-sized hunting knife in a sewn-in scabbard in his jacket. The briefcase is rigged, I think, but I couldn't say exactly how much bang-power there is in it, or how it's set up. Not enough time."

"That's good enough," I said. "How long before he starts to break down?"

"Twelve minutes before it starts to really take effect, fifteen to eighteen before he gets to feeling fiery."

"Fine. That's it for now. I'll give them a head start, then go after them. Buzz me when the ship lifts."

"Got you. Take care." She strode away, turned, waved, then picked up speed.

Everything was happening the way I'd planned it. Our Guy, Marcus Payge, pawn by random choice, was now Armed and Extremely Dangerous.

But I still hadn't come up with anything on how to finish the game; one battle might be won now, but there was still the war to think about.

I thought about that for the next five minutes, then started back for my skimmer. If Tonia's times were right, things would start rolling in eight to ten minutes.

Cinnamon's skimmer was parked and empty when I reached the city, which meant that she could be anywhere inside, using her most charming aspects on CC 1st Class Payge.

I pulled a handset from under the dash, clipped it on my belt, and went inside, pulling my furs off as soon as the door closed, leaving my bodysuit free of obstructions. I listened at Cinnamon's door for a few moments,

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making sure the place was empty, and went inside. I left my furs there, and started walking into the city, checking the time regularly. I was worried; I couldn't hear anything, or see anything. The drug's effects should be well at work by now. . . .

All at once, it hit, and it almost knocked me off my feet with its intensity. Damn near enough to knock the orbiter halfway back to New Stockbridge.

It was one long, drawn-out yell in my mind, somebody putting everything into screaming for help. Mixed in with it were bits and pieces; scattered emotions, flashes of pain, an identification that was assuredly Cinnamon, and some ugly images pertaining to blood, gore, rape, and ruination. I'd only wanted a rape blast, but every little bit helped.

I stopped my head reeling and grabbed the handset, dialing Deke's office. "Mitch, Candi, where'd it come from?"

Mitch's voice reeled off a place not too far away. I started running.

"Tone it down a bit now," I yelled.

"Aye aye, Captain Kenzie," Mitch said, brightly. "Bounce enough?"

"You damned near bounced *me* up to Number One Son, Mitch."

"I take it that's confirmation?"

"That's right. Nicely handled." I skidded to a halt in front of the designated place. Hell, there was enough yelling and squealing coming from inside, along with sounds of breaking things. Not bones, I hoped. Cinnamon would never forgive me.

I hit the doorswitch and plunged in before the door was fully opened. I could hear running feet not far away from me. Very effective, and great for morale.

I hit the floor in a running dive, and skidding most of the way, painfully for my hands and stomach, to where Cinnamon and Payge were fighting it out. Payge's face was bloodied, and Cinnamon looked like she'd been through a washing machine, and badly spun dry.

"What the hell do you think you're doing, buzzard?" I yelled, as I came up.

He didn't answer. It's hard to hold a conversation when you're fighting to stop somebody from poking your eyes out.

As Payge grabbed hold of a handful of Cinnamon's long hair, I waded between them. That was why I was here. And Cinnamon looked pure crackers—she was right into what she was doing.

I grabbed hold of Payge, and started to swing him around and down, which was the wrong thing to do to a trained spaceman, even in that sort of condition. He countered, got level, twisted, and threw me. I sailed gracelessly, and painfully, across the room, to land with a thud on an overturned easy chair. I went over it, unable to stop the roll, and banged a shoulder on the floor.

I got back up, glutton for punishment that I am, jumped over the chair, advanced on him with my hands held out, intending to push him back from

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Cinnamon. Cinnamon had other ideas about that; she snarled and threw herself at Payge, clawing for his face and kicking at him.

I risked a glance at the doorway, saw a half-dozen bewildered faces, and then started back at Marcus.

I managed to avoid Cinnamon, struck at Payge's stomach with one hand, and hit him with the heel of my palm, under the chin, with the other. He stumbled backwards, pushing Cinnamon away, shook his head. He backed away as I moved in on him again.

Then he pulled the trick that I was angling for. He plunged a hand around to his back. I was certain that he'd sorted things out by now, even in the state we'd put him in, and had made me his number one target.

I let him get the pistol halfway out of his waistband, and then gave him a piece of my mind, smack in the conscious area, at half throttle. More would have been fatal.

His eyes rolled up and closed, then he went limp and folded to the floor.

It had been a long time since I'd last had to do that. It had caused me a lot of trouble in the past; I hadn't killed anyone with it yet, but nearly had. At school, the teases would get me mad and start me crying; one day they'd triggered the shock-wave, and I'd flattened someone. It hadn't been long before somebody connected things to get the right answer, and life had been hell ever after, until somebody came looking for me with an offer to take me to Snowball.

I took it, naturally.

What I'd done to Payge was overload his conscious mind until it blew a fuse and shut down temporarily. He'd have a headache when he woke up, but nothing much else would be wrong.

Cinnamon let her breath out in a gush, and nervously shoved her hair back into place. She didn't do a good job of it. She glanced at Payge, then at me.

"I didn't have to fake most of that," she said.

I knelt by Payge, checking him over, looking for keys. I found a bunch with his papers. "Oh? Which bit did you have to fake?" I looked up at her.

She grinned. "Sweet-talking the bastard."

I stared at her in amazement. "You mean all the stuff I picked up was a real panic-yell?"

She nodded, rapidly. Uh-oh, bad sign. "It was a real panic yell," she said, jerkily, as if trying to swallow at the same time.

"Better untense, Cin," I said, sweetly, getting up and walking toward her.

She looked me in the eye, wound up, took a deep breath, held it for a beat, and let go as I made a grab for my handset. A nice, pure-toned scream, from the bottom of the lung. Also, in true fashion, from the wellsprings of the mind—and Candi was still monitoring. We got a high-power, high-bounce blast for about a second.

I managed to grab Cinnamon as she

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passed out. Strain on her system. She would be fine when she woke up.

Come to think of it, I felt a bit like fainting myself.

My handset bleeped, and I turned it on.

Mitch's voice said, "What the hell was that?" I told her. "It damned near knocked Candi flat on her back," she said.

"That would be worse. We would have to rebuild. Get a doctor down here for Cin, will you? She's out of it."

"Doc Barry's in the crowd."

"Thanks." I kicked some things around and settled Cinnamon down in a comfortable position as Doc Barry pushed through the crowd. His bag floated behind him as he walked into the room. He spared a single glance for Payge, then ignored him as he set to work on Cinnamon.

I pulled some of the crowd in to cart Payge's unconscious body to the outpatients section, and thence to the lockup. He might as well have the bloody and battered bits seen to, as he looked bad enough in good health.

I picked up his briefcase and looked it over. Might be worth a look . . . I unclipped my handset.

"Mitch, Candi, meet me at my apartment, and while you're at it, get Leon. I've got something for him to check out."

"Aye *aye*," Mitch said.

"Aye aye, hell, Mitch. Kenzie out."

I left, calling for a breakup, and countering calls for explanations. With the handset in one hand, and the case in the other.

Tower had my number by the time I'd settled into my quarters. Candi and Mitch were waiting, and Leon arrived, puffing, a couple of minutes later. It looked like he'd run all the way from wherever he'd been, which, when you're only a meter twenty-five tall, is no mean feat.

I hit the answer switch on my apartment com unit as Candi went to make coffee.

"Kenzie, what's been going on?" Fernando's voice demanded. "Whatever you've been up to put most of the people almost into shock."

"Same for the city," I said, settling onto the bed as Leon curled up on a chair. I signaled that I'd get to him in a moment. "Sorry about that. Had a spat with Our Guy from New Stockbridge." I gave him some of the details. Leon giggled, high-pitched.

"You must have set it up," Fernando said.

"Don't go accusing me for the frailties of New Stockbridge, Fernando," I said, grinning. "Story later."

"Well, we're getting howls aplenty about it from Belinski."

"Do tell. What did you do?"

"Put 'em off with a story about how we don't know what's going on. The truth, that is."

"Get them back and put them through. I've got some words to say to them."

"Got you."

Over the next five minutes, while

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Fernando renewed contact and patched through to me, I explained what I wanted Leon to do. Leon's a clairvoyant, and worth a dozen X-ray units any time. He'd make a thorough check of the case, find a telekinetic, and open it for me.

I gave him the keys and the case, and he left.

Candi came back from the kitchenette with coffee. "Something to fill up the empty space," she said.

"Thanks."

I'd just finished the coffee when he dulcet tones of Lieutenant-Commander Belinski demanded to know, "Are you there, Goodall?"

"I'm here," I said. "And I'm mad. I thought you said there would be no trouble if we—"

"I don't care what *your* complaint is, Goodall," she snapped. "I've got something to say to you, and you'd better listen to me, before we bomb you for the hell of it." That ended on a snarl. She really did have a temper tantrum wound up and ready to go. Not that I was surprised.

"What you got was caused by your Corporal Payge. He's in custody awaiting trial right at this moment. If we don't hang him, we might use him in—"

"You will release him at once." Flat statement.

I smiled at Candi. "He's welcome to walk away from here if he wants to. If that's what you want, we'll let him out, and he can walk out of the city scot free."

She kept silent for a moment, and when she came back, she sounded suspicious. "What's the catch? You're being clever, aren't you, Goodall?"

I signaled for more coffee, and made a face at Mitch. "Very astute of you, Lieutenant. If we let him out of the city, he'll have to walk all the way to the strip, providing he aims himself in the right direction. Without furs, heater, anything. Odds on he'd freeze to death within a kilometer."

This time it was pure fury. "I suggest you stop playing the fool!"

"I'm quite prepared to be reasonable, Lieutenant, if you are. All you've done since you got here is threaten and demand. Not a good way of doing business at all."

She was silent again, apparently calming herself down. "Maybe it isn't for you, but I've been assigned to complete this mission at all costs. If that means I have to blast a hole where your precious city is right now, then I will do that. I'm considering the best way to do that at the moment. What's this all about?"

I raised my eyebrows and grinned at Candi as she handed me a filled cup. "Well, it's partially about attempted rape, and partially about two charges of attempted murder. Charged is the aforementioned Control Corporal First Class Marcus Payge, sent as, if you'll pardon the expression, your envoy to Snowball. Instead of acting like a normal human being, he got all het up over the assigned hostess, attempted rape, met with a fight, attempted murder, met with the screaming you got—that was the vic-

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tim, lady by the name of Cinnamon—attracted a large crowd and, in front of same, tried to finish the job, then tried to do me when I attempted to stop him. Pulled a rather effective little laser pistol that he shouldn't have been carrying—he was also wearing some other lethal and illegal objects—and was in the act of trying to shoot me dead when he was stopped."

"How—"

"I knocked him out."

"What—"

"Trade secret. As it stands, he's now awaiting his trial."

"If that is the case, Goodall, I want—"

"Oh, shut up, will you? If you want one of your ship lawyers present, you're welcome. But I'm not allowing Payge out. He's a bloody menace. He shouldn't have been carrying half an armory for a start, and you should be able to do better than to select someone as mentally unbalanced as he is. Surely you should be able to detect a rapist amongst—"

"Payge is perfectly stable. I have a report here on his whole mental and—"

"It's only good for wiping your arse," I said. I sipped my coffee.

"This is a detailed report, Goodall."

"I can write one just as detailed. Worth the same. Okay? Pure junk."

I sat up and finished the coffee. "Besides, you still haven't said what you want Ayna Parris for."

"I've already told you—"

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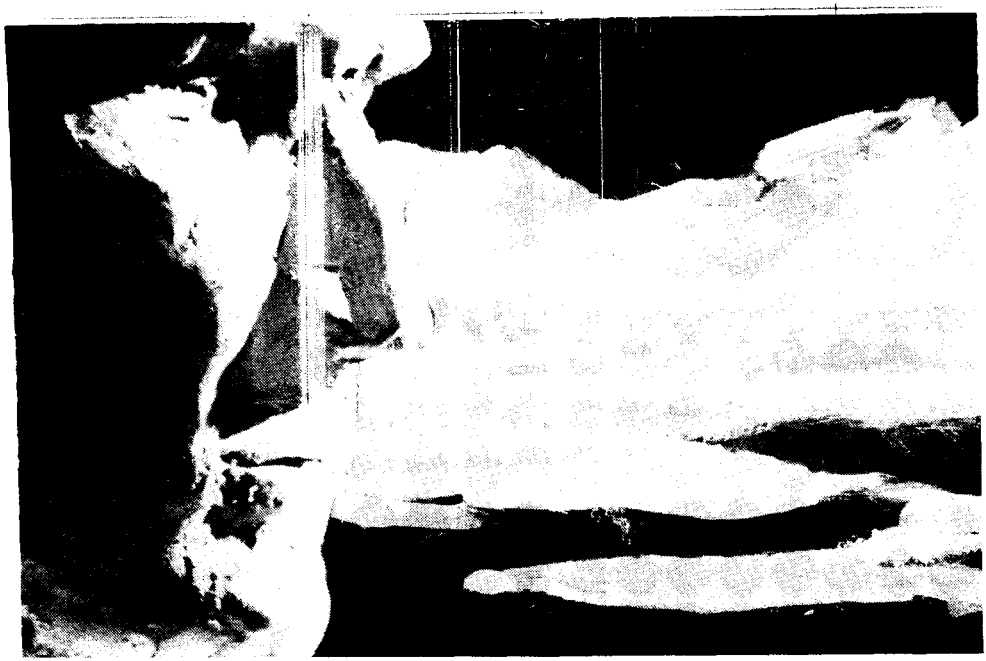

"Skip the repeat. How does an escaped convict manage to steal a special Government prototype?"

"Our security was bad."

"So you say." I paused, shook my head at Candi and Mitch. "Look, we'll give Payge his trial, then suspend sentence and ship him back to you. Then we can fly somebody else back down and you can have your ship and the lady."

"I don't trust you. I'll give you twelve hours for the trial. That's all. Then one of my boats will land. You will bring Parris and Payge to it directly while one of my men transfers to the prototype. Understood?"

I shrugged. "Understood." That idea was nagging again.

"No more tricks, understand, Goodall? Otherwise I'll lay into you and your city."

"Tch tch, your temper is unbecoming of a mission commander, Lieutenant."

"You're trying to be funny again, Goodall. Don't start it. I'm not easily amused. And no more of those mind-attacks either. Next time I won't bother to call."

"There won't be a next time," I said.

"Exactly. Twelve hours, Goodall. That's it."

"Twelve hours, fine."

"Good."

End of conversation. I reached out, switched the com off, and said, "I think I've got the right idea this time."

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I started to talk.

Candi had had it all along: Empty barrels.

Ching said, "You want *what*?"

She wasn't too pleased, I could see that. Her meter sixty-five frame packed in a lot of fury a lot of the time; it seemed an odd contrast against the fact that she was pure oriental, and very cute.

I said, "I want anything that'll produce a lot of confusion. Lights and sound, anything you can do with those two things."

"You sure you don't want electroshock, acupuncture, and a bed of nails as well?"

For all her sense of humor, Ching was also the best pilot we had on Snowball. She could do things with a ship that no one else would be insane enough to even consider.

"Lights and sound will do," I said.

She looked at me for a few moments, apparently wondering whether a good shouting at would cure me. I'd woken her up to get her to put together what I needed.

Finally, she shook her head. "Okay. Light and sound. I'll need a hand, though."

"You've got it," I said, and we set to work.

Over the next hour we put together a pile of electronic and electrical equipment that would have made most technicians faint in horror. Ching paid no attention to fine details, simply jury-rigging a big enough busbar and wiring everything into it.

When we'd finished, she said, "There you are." She sounded proud of it.

"Let's see it in operation," I said.

"Sure." She squirreled around amongst the wires, threw some switches, and stood up, switching things on.

The resulting cacophony was a deafening, blasting, melange of pure noise, music, speech, echoes, distortion, and random light sequences. It only lasted a minute, but that was enough for me.

Candi had joined us ten minutes before, standing in a corner and watching. As the racket died away, I turned to look at her. She had her fingers in her ears and her eyes tightly shut.

I walked over and slapped her backside to get her attention. She looked down at me.

"I'm going to have to put up with *that* for as long as you need?" She pulled a face. "This had better work, Kenzie. Or I'll roll *you* in the snow."

I laughed. "I don't doubt it. Think you can handle it?"

She nodded. "I should be able to. Seems I'll only have to pay a little attention."

"I can have you put under hypnosis if you like."

She shook her head. "I can put myself under. A trance might help me to concentrate properly without feeling it too much."

"If you say so."

Candi shrugged. "I get the feeling that upstairs don't think we're much more than a nuisance."

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I grinned, ruefully. "That's all we are. We've got nothing." I checked the time. "I'm going up to the tower for a while. You and Mitch had better finish collecting people together."

Fernando had gone off-duty in the tower when I got there, twenty-five minutes later. I'd stopped to check with Doc Barry on Cinnamon's condition. She was peaceful enough.

The controller on duty was Gerard Clarke. I had to think for a moment before I got his name—it's a little difficult to remember some seventeen hundred names, even when dealing with most of them—and he was both an empath and a precog, the latter ability in a minor form.

He turned and grinned at me as I walked in. "Good morning."

"Morning, not necessarily good," I said, with a wave. "If you know what I mean."

"He's still sitting quietly," Gerard said, indicating the bank of monitors. "He's done a couple of complete orbits. Number two is pulling that signal in."

"Hmm." I looked at it. The usual fuzziness. I nodded. "Good enough. Which one will he be in range of in, say, an hour?"

Gerard pulled a face as he worked it out. "Number one and number two will both be pulling him in. Why?"

I scratched my jaw for a moment. "Pull the plug on number one in an hour. Can you make it look like a breakdown?"

He raised an eyebrow. "Sure. Trick in the works, do you Kenzie?"

"That's right. No looking forward, though. I don't want a bad opinion on it yet."

"Okay. Wouldn't matter anyway, would it?"

I looked at him for a moment. "Nope."

"Any details for me?"

"Later." I watched the screen for a moment. "We'll be sending up one of the ships for the repair job, as such it won't be. I'll be going with it, so I'll drop by the tower again before we leave."

"Which ship?"

"I don't know yet." I headed back for the door. "See you when."

"See you when."

Now I had to see the people Mitch and Candi had pulled together.

The explanations didn't take up much time—what there was in the way of tactics and strategy were simplistic. The main stress was on what each person would be doing, and how fast things would have to be done.

Candi and Mitch had rounded up as many telepaths as could be carried, along with a bunch of high-power telekinetics and some clairvoyants, including Leon. The case had proven to be a dead end. Nothing we could use.

I said, "It's going to be a painful experience. If anyone feels it'll be too much to handle, they can back down." They'd already had a dose of Ching's wonder machine. Nobody backed out.

I looked around the group again,

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and said, "All right. We'll rejoin at the strip to board the *Second Chance Of A Lifetime*." There were a few chuckles. "Take different routes and get into the hangar and wait for me. Mitch will be leading you."

Then I dismissed them.

Ching and Cinnamon would be piloting the *Second Chance*, leaving Candi to operate the wonder machine from the studio. Things would start to get interesting soon.

Unfortunately, I didn't realize how interesting at that time.

Twenty minutes after Number one comsat went out, I was back up on the Tit, in the tower control room, with the New Stockbridge ship on the line. Belinski wasn't available, apparently, so I was talking to a sub-Lieutenant Banton.

"Where's Lieutenant Commander Belinski?" I asked.

"She's sleeping," he said. "I'll handle whatever you've got to say." Right to the point.

"That's okay, it's nothing much anyway. Did you just shoot out one of our comsats?"

I heard an unhappy sigh. "I was warned, Mr. Goodall. To answer: No, we did not. This isn't a trick, is it?"

"No trick. One of our comsats just went out. I had a notion you might be involved. Sorry." I paused for a moment. "You can check it."

"We are doing that right now. What's happening with Control Corporal Payge?"

I grinned. "We're just arranging his trial. Got some people who want to dump him on the ice, but we won't do that. He's safe. Everything else is ready."

"As long as you don't do anything stupid," he said. "That's all?"

"One more thing. We'll be sending up a repair crew for the comsat. We'll have to pull it in and fix it."

"Ordinary repair ship?"

"Cargo barge. We haven't got anything smaller. We'll set up the repair shop before we lift. Ship's called the *Second Chance Of A Lifetime*. It's a converted hundred-berther."

"Bit big for a repair job." He paused. "Weaponless?"

"Yes."

"Just a moment while I check this."

I slapped the mute switch and swung around, blowing my cheeks out. Luck of the draw, I guessed. Belinski would have howled about it. Banton was a bit more reasonable—on the other hand, he had less to lose than Belinski.

Banton came back on the air. "We confirm on the comsat, but—"

"It's got to be fixed sometime," I said.

"Just a moment." There was silence for a moment. "Sorry."

"Huh?"

"What Mr. Banton is saying, Goodall," Belinski's voice said, "is *no*. That comsat going off so suddenly is a little too convenient."

I slumped. Too much too soon. "But we can't do without that comsat. Our mines—"

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Belinski sighed. "Forget it, Goodall. I was woken up just for this idiocy, and I'm not pleased." She paused. "In fact, I've had just about enough of your games."

"Will you listen to—"

"No." She was off the air while I fumed, silently. "I'm sending a boat down immediately. You will cooperate from now on. I'm not going to stand for *anything* from now on, do you understand that?"

"I think I got the message. Snowball out." I hit the switch. "*Goddamn.*"

I was having trouble believing it. One of my wild ideas had finally done the trick. *Now* we were in for it.

"You'd better handle the landing, Ger," I said. "I'd better get ready for the Inquisition."

It took me a few minutes to explain the mess I'd gotten us into, once I'd gotten back to the strip. There was silence for a minute or so.

Then Mitch said, "It could still work."

I shook my head, watching my breath misting in the air. "They were expecting me to do something like this, Mitch. I picked the wrong diversion."

Cinnamon took hold of my arm. "Can't we do anything?"

I shrugged. "Don't look at me for ideas, Cin. I'm a bloody full-force failure. I had it coming."

"With that sort of attitude, I'm not surprised," Mitch said. "You know we're standing here freezing our asses off and just moaning? We haven't been in the firing line yet."

I looked at her, surprised. "Are you trying to tell me something, Mitch?"

"She's saying you shouldn't be a quitter!" Ching yelled. There was a low mutter from the rest of the group. "Dammit, Kenzie, we didn't start feeling sorry because we had to struggle with Snowball."

Linza Freeman, at the back of the group, said, "I get the feeling that we're being given a helping hand."

I straightened up. "What?"

"Well, they're coming to us. We can tackle them down here."

I clapped my mitts together. "Dammit, Linza, you've got a good point. I should have thought of that."

"Except you don't think," Ching said. "How long before they get here?"

Mitch said, "Gerry gives us five minutes. They're on the way."

I made a swooping motion with one hand, toward the hangars. "Everybody move and get under cover. We'll stay in contact through the telepaths. Everyone follow my lead."

It didn't take us too long to squirrel everyone away.

The ship came out of the east, looping around and coming down along the strip. The bulky machine turned at the bottom, powered up, taxied to the parking area, and settled down, squatting darkly on the ice.

I said, "Give me a couple of minutes," waved to the group in the hangar with me, and walked out to meet the ship. It could get me killed

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. . . well, I didn't much care. If I failed, life wasn't going to be worth much afterwards.

I stopped a few meters from it as twin doors slid aside and a ramp folded down. A small group of men, dressed in uniform gray and carrying identical dark weapons at port arms, trotted down it, onto the ice.

I held my hands up and said, "I'm Kenzie Goodall."

One of the men, a tall, black officer, strode away from them, stopping a meter in front of me. "I'm sub-Lieutenant Banton. Got yourself into a mess, didn't you?"

"Me?" I said, innocently. "Not really."

He gave me a puzzled look. "You must be kidding."

"Not me. Where there's a will there's a winner, my friend." I grinned at him. "What am I supposed to do?"

"Cooperate and do as you're told." He glanced around.

"*That's* me. I have a slave mentality."

That was enough to exasperate him. "Goodall, things would go better for you if you got some sense into your head and played safe."

I shrugged. "There may not be much sense in my head, but there's a lot of other things." One of the men behind Banton was starting to fidget. Well, well. "What do you want me to do?"

His mouth opened to say something, but there was a sudden loud, choking gasp from behind him. He turned as one of the men went to his knees, pulling at his uniform. He was slowly being strangled by it.

Banton whirled back, bringing his rifle up to aim at my face. "Stop that, Goodall! *Now*!"

"It's not me," I said, pleasantly. Then I let him have the shock-wave, in the middle of his consciousness. He folded up as I turned and hit another man with it. He'd been starting to aim at me.

Another man was trying to help the man with the homicidal uniform. His rifle tore from his grasp, looped up, struck the back of his head, butt-first. He hit the ice heavily, out cold.

The ice exploded under the fifth man, tossing him back into the ship like a toy. The broken chunks converged on him and battered him into unconsciousness. The sixth and final, man took aim at me, pressed the firing stud.

Nothing happened. One of the tk's had wrecked the mechanism. I hit him with the shock, watched him fold up, and ran back to the hangar. Leon had said twenty-four in all. That meant—

"Sixteen still to go," Leon said, as I squatted down behind the wall. I looked at him, puzzled. "Two pilots, both disabled. We left the others alone in case they decided to do anything drastic. But they can't get off the ground."

"And they don't have anyone to tell them to attack us. Fine." I looked around. "Linza, where's Fernando?"

"On his way," she said. "A minute or two." She changed her position. "He'll come straight inside."

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"Thanks, heart," I said.

Fernando's skimmer arrived a minute later, skidding straight in and under the wings of the *Second Chance*. He jumped out as soon as the gullwing doors flipped up, and joined me, looking out at the ship and the unconscious men. The telekinetics had been at work again, dragging the bodies away from the ship.

Fernando looked at me with raised eyebrows.

"Smoke 'em out, Ferdie," I said. "There's eighteen of them."

"Any time," he said.

He sat down on the hangar floor and shut his eyes, concentrating. A little finesse was called for here; Fernando could just as easily destroy the ship as warm it up.

At the door to the ship, there was a sudden flare of orange light. Then a great gout of flame roared into the air, licked around the ship, vanished. A cloud of steam rose from the ice, where the flame had touched. It was another couple of minutes before any reaction set in, and then the remaining men came pouring out of the door, most of them stumbling. The two pilots were in the rear, staggering, their hands clutching their heads.

The leading man slipped on the ice, where Fernando had melted it, fell heavily onto his back, struggled to get up. The man behind him dodged to one side, and suddenly appeared to drop. He sank to his waist in icy water, letting go of his rifle. He tried to pull himself out, failed miserably.

I signaled my people and we charged from the hangar. As we broke out into the daylight, the ice around the ship exploded upwards, pelting the men. Some dropped their weapons and tried to get back to the ship, others simply started reeling about in confusion. Mitch and her telepaths were playing games with their minds.

The doors of the ship slammed shut, blocking escape.

One man tried to force the doors open by hand. He didn't have a chance, but I shocked him anyway. He slid down the door, rolled down the ramp, tripped another man.

Within ninety seconds, we had the job finished.

I leaped and cheered.

We gathered the weapons together and threw them inside the lander, then attended to the squad. We piled them neatly inside the terminal building, leaving them to the tender care of the people in there.

Ching and Linza ran for the *Second Chance*, with the telekinetics in tow. Cinnamon and myself checked over the New Stockbridge lander while Fernando fetched suits. There was nothing fancy about the control setup, just the plain old stuff found on most ships. Except Ayna Parris's stolen prototype; that had been designed as a fast fighter-bomber. Soru and Sira wouldn't stand a chance against a fleet of those.

I gave the thumbs up as *The Second Chance Of A Lifetime* lumbered from her hangar.

The *Second Chance*'s tail-flare was

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vanishing into the distance as I started the take-off run with the New Stockbridge lander. We gathered speed, kicked up heels, got bitten by G-force. It wasn't long before we were almost on top of Ching and Linza.

"Fire," I said.

My weaponsmaster touched some buttons, unleashing a burst of laser fire at the *Second Chance*. He missed.

"Your aim is despicable," I said.

Fernando laughed. "I guess it is, Kenzie."

I looked back at Mitch, who was sitting in the navigator's seat. "Get ready. As soon as we're in visual sight of the New Stockbridge ship, let go."

A few seconds later, we were in a set orbit, and the ship's gravity systems took over, pulling us down from free-fall to Snowball normal. These people adjusted for the places they expected to be.

We trailed after the *Second Chance*, firing an occasional burst at her tail—missing abysmally—until the lander's screens had the mothership clearly centered.

The communications rig started to buzz. I adjusted my headset, hit the answer switch.

Belinski's voice said, "What's going on, Lander nine?"

I hesitated before saying anything, considering what to do. *Ah, the hell with it.*

I said, "We have problems, Lieutenant-Commander."

"I noticed that," she snapped. "Can't you shoot straight?"

"Sometimes, even I wonder about that."

There was a long pause. I nodded to Mitch. Belinski said, "I might have guessed. What are you trying to do, Goodall?"

"Nothing much. Care to surrender?"

She laughed.

A couple of seconds later, two things happened. Most notable was that Belinski started to scream. The other thing, less notable, was that the New Stockbridge ship fired a sextet of missiles. The radar picked them up as they started tracking us.

"Fernando," I said.

"Got you, Kenzie," he said. His face screwed up.

The missiles exploded, not far from the New Stockbridge ship. There was a white flash, then a rapidly expanding dirty white cloud of debris. It vanished after a few moments.

Belinski's screaming died away. "Damn you, Goodall, I *warned* you."

Then she started screaming again. What Mitch and company were doing to her mind wasn't very nice at all. *Tit for tat, Lieutenant*, I thought.

"Situation, Mitch?" I said, as I let Cinnamon take over. She started looping us toward the mothership.

"They're frozen. Leon's got the lander bay, so you can start going in." She gave Cinnamon some instructions.

I nodded, hit the communicator switch to shut off the screaming, and stood up. "Suits, people." I looked at the screens. The Stockbridge ship was

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rning end over end, slowly. "And
l them to stop doing that, or we
n't be able to get in."
"Got you," Mitch said.
Verniers fired and the ship stopped
ning.
The lander bay was at the back of
ship, a gaping cavity. Cinnamon
k us down carefully, slotting us
ween the other landers. I passed a
t to her as she stood up. She would
t for us to return.
We charged out of the lock, taking
e as we moved around. The tk's had
pped gravity to thirty percent, and
Stockbridge people would be able
handle it better than we would.
Fernando stopped, concentrated,
blew out the lock at the bottom of
lander bay. The area behind it was
ked with white suits. A few laser
sts struck metal around us, burn-
through, but they weren't able to
a line on us. Too much confusion;
ng's setup was working well.
We charged through, taking away
pons and shocking a few into un-
sciousness. Equipment was flying
nd, creating havoc. The telekinet-
gain.
leaned on a bulkhead and watched
he suits bounced around, into each
r and the bulkheads.
"Think we're really needed?"
ch's voice asked.
said. "Well, they might hurt
nselves."
Let them."
"Now, now, that's nasty." I
ghtened up, ducked a wandering
butt, and shocked a suit as it came

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too close, and hit the switch for the next lock along. The door slid aside and we crowded into the space.

The door to the other side opened. The situation was much the same. A few had more than the usual amount of wits about them, and one got a line on me with a hand laser.

The rifle butt I'd ducked earlier slammed into his arm, making him drop it before he could fire. I shocked him.

We went through the ship, finding more of the same. Confusion, utter and complete.

There was a dead technician lying against a wall across from a burned-out computer keyboard. I made a swift check of it, and nodded to myself. We'd just made it. The unit was the one that would have controlled the bombing of Snowball.

I left the others to attend to the stripping of the crew. They would be piled in their cabins and left; gas piped through the ventilation system would keep them under control.

I found Belinski a few minutes later, in her cabin. She'd obviously seen it coming when all of the ship's systems either froze solid or went haywire—Leon and the telekinetics had been responsible for that, mainly to stop Belinski from bombing Snowball—and she'd decided she didn't want to see the outcome. She knew she was in serious trouble.

She'd killed herself, very neatly, with a hand laser. Death before dishonor—

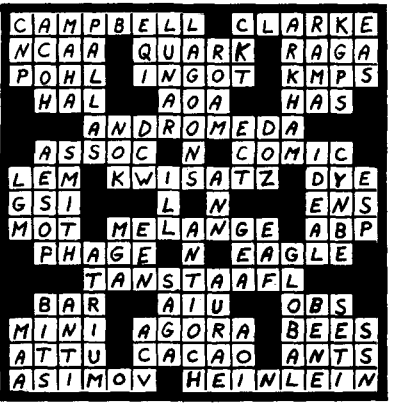
—I hadn't known anyone still bothered with that.

I climbed out of Cinnamon's skimmer in time to see a mountain of fur lumbering, with a touch of grace, from the nearby lock. Coming straight at me. It looked like a Snowman blown up to ten times normal size.

I stood my ground.

Thirty seconds later, Candi grabbed hold of me, lifted me fifteen centimeters from the ground with consummate ease, and damn near squeezed

Felix Polz's science fiction crossword: **solution**



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the breath out of me before sloppily kissing me and plonking me back on my feet.

"You soggy hound," I said, laughing.

"I don't care," she boomed. "That was the wildest thing you ever did right."

"I never do things wrong," I said. "I was only joking before."

"*Hah*! I never said you did things wrong. But we won't get a rest after this. You'll just get wilder."

She turned and strode back to the lock. I glanced at Cinnamon, who looked back with amusement, and followed her.

We went down to the Coffeebar, shedding the fur on the way. We met with a happy welcome, although Deke was nowhere to be seen. Candi gave them a minute, then shushed them, and led the way through to the coffee—if ever there was a time for alcohol, this was it—and poured out three cups. There was nowhere to sit, so we stayed propped against the counter.

"I've got another answer for you," Candi said, as soon as we had some coffee inside.

I pulled out a small notepad and dropped it on the counter, looking for a stylus. "To which question?"

She grinned. "To how you get rid of the ship and crew."

"This has to be something to hear. So tell." I found my stylus, and started making notes on the pad.

"We send them to the Federation with instructions to tell all."

I shrugged. "That was my thought. I haven't figured out how we go about doing that yet."

Candi poured herself another cup of coffee. "We give them a zombie mentality."

I stopped writing. "A *what*?"

"Zombie mentality. We put a mindlock on them, bar out each personality, and program them. It won't affect their operations—they won't wreck the ship or anything like that—and it won't do them any harm. It can be taken off when they're ready."

I looked at her in amazement. "You're wonderful. That's as wild as anything of mine." Then I stopped and frowned. "What if they don't have anything to do with this wild idea of mine?"

"They're still in trouble for threatening to bomb us out. We've got a case, got evidence, and we can push it through."

"You're right."

"Of *course* I am. And not only that, we've also got two other ships. Plus CC Payge and his release codes—what are you doing?"

I was scribbling again, making an itemized list. "Writing a bill for the Feds."

"*Hmmm*?" She peered at it. "I knew it. Another wild idea. That Snowball Services thing you were talking about a couple of weeks back?"

"The same," I said. "Seems we've got a lot of empty barrels we ought to start filling, so . . . ."

She chased me all the way back to my apartment. ■

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Hostility has its uses—and its limits.

DAN HENDERSON

Rit Carruthers celebrated his thirty-first birthday as alone as he could make himself—a full kilometer out from the four milky-white domes of Alpha Lunar Hospital. He breathed metallic air from his tanks, felt the tickling at the bridge of his legs that assured him the suit A/C unit was working, and tasted wine left on his upper lip from the party he had given himself an hour before.

The Moon ignored him, and he basked in her ignorance. "This world is hostile to man," he thought. "Not by motive, by nature." The insight made him happy—or it made him what he called happy: maintaining a relative peace with a hostile world. It was away from the alien venom of the Yatz, and away from the mindless stings of the bureaucrat Rushing.

Nothing sounded. Man noises got swallowed up. The only sounds were pseudo-sounds, vibrations carried by the metal of his suit. He saw his footprints in the coarse dust, and was pleased that the Moon would not even take the cosmetic step of closing them over. He smiled, feeling as aged and impersonal as the uncaring dust.

"For my birthday," he mused, "Continental Industries might make me a gift of the hospital. And change the name to Alpha Lunar Home for Lunatics." But CI could be wrong: He wasn't about to go crazy. Not on his salary. He thumbed his nose at Earth—an odd, peculiarly significant gesture due to his massively gloved hand and the mirror of his faceplate.

He turned toward the pearly domes. The name "hospital" was justified by fifteen beds on one floor of one dome. CI had needed a cover in order for the United Nations to grant it a Moon facility. Most of the "hospital" housed corporate secrets. One of them was Rit Carruthers.

"Base to Carruthers."

"Carruthers here."

"Time to come in. Ninety minutes to contact."

"I'll be along."

"You'll be along now!"

"Come and get me," Carruthers said, chuckling. The threat silenced BS (for Base Supervisor, among other things) Rushing. BS had tried sending men after Carruthers before, and had discovered how impossible it was to play tag on the Moon. The entire base staff knew of the escapade—and would love an encore.

"All right, dammit. Twenty minutes. That's it."

"Check."

"Base clear."

"Carruthers, partly cloudy."

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He couldn't mute the speaker, but he could obscure it. He switched on a tape of Beethoven's "Ninth."

The music pleased him. He felt giddy, wandering from blinding light into inky shadow, with a full symphony blasting away in his helmet. The sound had all the brilliance and symmetry of R-theory, the first gift from the alien Yatz to man.

"And they think I'm big-headed!" The man on the Moon chuckled to himself. Beethoven had been among the most arrogant men of all time—and he'd had a right to be.

Carruthers suspected that he, too, had that right. How else could one explain Continental Industries' continuous obeisance to him? The monolithic, multigovernmental corporation could as easily crush him, if he were an ordinary man. But he'd demanded, and gotten, this privilege of solitary Moon walks—as well as the custom tape deck for his suit.

"As long as old Rit's the only one who can handle the Yatz, there's nothing they won't do for me," he thought.

The "Chorale" began and, somewhere down among the horns and drums, he could hear the Base calling him. He ignored the summons. Carruthers knew exactly how long it would take him to unsuit, put on his warpaint, and hustle down to the R-dome. But he wanted to be back in time to have a cigarette: Already, his stroll had carried him too near the airlock.

It slid open before he could press the exterior call. Meaning someone had been watching for him.

He stepped inside. The door closed. He slouched against one wall of the stainless-steel chamber. He felt the vibration of pumps at his shoulder. As air moved in, he began to hear them. The green light blinked on. He took off his helmet.

He began the graceless routine of getting out of the suit. He could see his face in the opposite wall. Cauliflower ears and a broken nose: A pacifist, Carruthers had learned the virtues of peace the hard way. His hair was close-cropped. The scar of the R-implant showed on his scalp. It was his badge of superiority.

The inside door opened and Carruthers stepped into the anteroom. Rushing and "Emerson" were there. Emerson was Rushing's executive secretary. Carruthers had given her a new name, and it had caught on:

"Knock, knock."

And she had said: "Who's there?"

"Emerson."

"Emerson who?"

"Emerson fine boobs you got there, honey."

She had not spoken to him since. Fine. It was what you expected from the brainless types who became BS secretaries.

"Put this up." Carruthers said, dumping his suit in their direction.

Rushing frowned and Emerson obeyed. Rushing said, "It's been forty minutes. The brass want you for a conference."

"I've nothing to confer."

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Rushing looked desperate. "Look, Rit, do it for me. I mean, they can get me."

"Sure, sure. Hustle on down there and tell 'em I'm coming."

Rushing beamed, started to say something, changed his mind, and glided from the room on rubber-soled shoes.

Carruthers watched him go, shook his head at the sight of the retreating back, and reached for his tooled leather boots. Emerson stalked past. Carruthers watched. He wondered if it were possible for a woman to sway with malice.

If so, Emerson had the knack.

Carruthers remembered the first time he had seen Rushing. Boy, had the little bureaucrat hemmed and hawed. It had happened back at the Multiversity.

It had happened like this:

"There's got to be some catch," he'd said, enjoying watching his visitor squirm in the rickety chair generally reserved for students. "Why in God's name would Continental Industries need a primitive anthropologist on the Moon?"

Rushing had colored beet red. "They just do."

The anthropologist had snorted.

"All right then. You know about the transmissions picked up from the aliens?"

"Certainly. And I also know that the signal is more than five hundred years old. Those aliens couldn't be very primitive."

"Well, no, not exactly. But that five hundred years thing—that's just what CI tells the public."

"CI? Continental Industries?"

"Right. They bought research rights to the tapes. They—"

"Research rights? Since when has CI been interested in research? Pure research, at that?"

The bureaucrat squirmed a little more. "Well, of course, they, um, they stood to profit from it. You see—you understand this is confidential?—part of the information in those tapes was something called R-theory. It makes mechanically aided telepathy possible, I'm told. Instantaneous communications with the Yatz."

Carruthers took that in. He opened a leather-bound volume of Plutarch's "Lives." It contained a whiskey bottle and two shot glasses. He glanced at Rushing, who shook his head, and filled only one. He downed it. "So?"

"So it's possible for us to communicate with the Yatz."

"Ah, that word again. Yatz. What's that?"

"The aliens."

Carruthers refilled his glass. "And?"

"The Yatz have proven very hard to deal with. Very hostile, very primitive, in spite of their technological innovations. Two men have already broken down from the, ah, pressures of negotiations. CI thinks you can handle the job."

"Doesn't make sense," Carruthers said. "Why me? I'm just a lowly college-prof type, even if brilliant. They want me to bore the Yatz into

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cooperation, right, Rushing?"

"No. Not that."

"How much is CI willing to pay?"

"I'm authorized to offer one thousand credits-per-day. Plus benefits. Plus expenses."

Carruthers whistled long and low. A year's pay every month. "For what?"

"You are a professor, but you are also a primitive anthropologist with much fieldwork to his credit. We know."

"I'm sure you do," Carruthers said. "But you also know about Benton and Marquez, who have done more work. So there's something you're not telling."

The little man took a deep breath. Carruthers could see the pressure building behind the pale eyes. The words damming, until he cracked and a torrent came pouring out: "They told me, Dr. Carruthers, they told me, they needed a strong personality type. No, even more." Rushing glared at Carruthers, a glare that soon was to become familiar.

"They told me, dammit, they told me they needed an arrogant SOB for the job. And I checked. And there was one man with the credentials, one certified SOB, to boot, and you're it."

Carruthers nodded. He drank the last of his whiskey. He smiled "I'm thoroughly charmed. I'll take the job."

Carruthers had learned to love the Moon. But he hated CI. The dead-eyed, bellied Execs couldn't begin to understand the torture in his brain each time an R-transmission was made—or the personal agony his failures were causing him. Worse, they had insulted him by thinking more money would be a balm for his hurt.

Money couldn't cure alienation.

"Alien-nation," he thought. Marvelous. In a world gone totally egalitarian, absolutely pedestrian, you couldn't expect appreciation for personal achievement. Ah, well.

He remembered the aftermath of the early R-sessions.

"It's just Moon-lag," Rushing had first proposed. The anthropologist had choked down his nausea and continued to work.

After a while, he'd said, "It's the same one every time."

"You're sure?"

"Yeah. Gestures are idiosyncratic."

"Oh."

And Carruthers had stuck to it, staking his pride and his ambitions on the Yatz. He honed his hate, his misanthropy, and his curses until, at last, he felt he could jeer a shuttle-pilot into a convalescent ward.

"God, Rit, you're foul lately."

He'd only sworn some more, and gone on.

"Communications with the Yatz are based upon a protocol of insult," he wrote in his first dispatch to the Board of Directors of Continental Industries. "That requirement is a reflection of their pride, their will, and their inability to be humiliated. Only

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if they believe an Earthman to be their equal will they communicate."

Contact occurred every 12.78 days, an apparently arbitrary figure set by the aliens. Carruthers used the time between contacts to read up on the Yatz, the strange lizardlike race posited in the direction of the constellation Cassiopeia. Their curious antagonism, he found refreshing. It was better to have refined hostility, than refinement covering hostility. More esthetic, as well as more honest.

Technical data bored Carruthers, but he was enchanted by the simplicity of the R-theory. Simple to use, that is: Its mechanism was not yet understood.

That fact only increased his awe for the mental capacity of the aliens, and he began to see how mind-to-mind contact might send men careening into madness. He reviewed the clinical records of Silas and Montgomery, the two "communicants" who had preceded him and now were permanently institutionalized.

But the two hadn't had his background, or his will, or his mind: Whatever the Yatz could dish out, Rit Carruthers was sure he could take. And hand back.

Reviewing films of past contacts, listening to transcripts, studying his own errors in strategy, only deepened his conviction that he was bound to succeed.

Until, one day, to Rushing, he said, "All right, you son of a file cabinet with carbon-paper for brains—I'm ready."

The supervisor poured him whiskey.

"I can't go back in there," said Rit the Humble.

"I know. It was bad. Drink this."

The glass emptied, was filled, and emptied again.

"I mean, why should I? You saw what it was wearing around its neck?" he said, feeling the bile in his throat.

"I saw, But it was nothing like what it was saying. And the lizard wasn't even warmed up good."

The anthropologist shuddered. "I know."

"Do you? You've seen the films, sure, but have you thought about them? I'd say it was in second gear, headed for third, when you broke. But that's good—"

"The Yatz didn't sign off, You did," Rushing said. "It's sticking with you. It's a good sign."

"Great sign, fantastic sign. 'Prepare to meet your Maker'."

"It's a step in the right direction."

"Crap, if that's the right direction . . . Pardon me, but I think I'll go in the other."

Rushing was silent for a moment. He filled Carruthers' glass again. Then he said, "Emerson thought you would quit."

Carruthers frowned. And decided he would stay.

"Now what the hell's the matter? I'd stonewalled it damn good then wham! The screen goes black and he's gone."

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"It doesn't respect you. You're losing it."

"Doesn't respect me? Jesus."

"Try yelling. You're awful quiet in there."

"I'm hoarse already."

"Practice."

"Stuff this. Stuff you."

"Sure," said Rushing, with the self-certainty of a true believer.

Carruthers felt nauseated, having this human Jello look up to him. But he practiced.

The Apollo Bar provided the extra luxuries that the rest of Alpha Lunar Hospital lacked. Its interior was as wasteful an expanse as its exterior was frugal. Dim gaslights, not neon, shimmered on the surfaces of real wood tables; corridors spun off from the bar arena to the party rooms, oversized cubicles with deep pile carpet and thickly cushioned chairs; across the room from the multicolored liquor racks a dark shape was lodged against the wall, its keys gleaming yellow in the light of a single golden bulb. A piano. A Steinway concert grand. It provided the only live music on the Moon. Pop stuff came from holos.

CI knows the basics men need to survive, Carruthers thought, each time he entered. And he entered often. But he never followed the winding corridors back to the Lay Ladies. No. He himself was illegitimate, and he was proud of it. He didn't mind that his mother had only known his father as "September"—the month of their affair. It was only that Rit Carruthers—rejecting sex as he rejected Rushing—could not accept easy pleasure. It was a violation of the superior mind.

But Carruthers entered the Apollo often. First, there was the liquor; then, Rushing's wife frowned on drinking and so he was usually spared the banalities of the bureaucrat; and, finally, if he had a friend on the Moon, it was Pinter the Bartender.

Pinter, staff psychologist cum bartender, was a pleasure. He was a jowled man of forty-five, with the huge red hands of a farmer, who blew great clouds of cigar smoke while Carruthers talked.

"I can't make it out. I get to the point where Hun's—"

"Hun?"

"That's my alien chum."

"Got it."

"Anyway, Hun's been going on about the whiteness of my belly, and what that reminds him of, so I've just got to come back with what he must smell like, and the lousy yarble-bag sort of sneers at me and fades."

"That must have been a relief."

"No—a problem. I think these pansy-blue coveralls CI gives us are the trouble. I'm working up my own uniform. You should see it. It's got—"

"You sure take all this damn serious."

"Of course I do. With the Yatz, there's still a hope of waking up the human race, still some hope that Homo sap can make the transition into Homo sapiens. We're karmaed out.

"Just think about the genius of the

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R-process. Anybody who can design that is light-years in front of us."

"Maybe."

"Maybe, my chockra. They are."

"So you say. But my experience is that civilized beings take compassion on the less civilized. They don't carry on like shuttlers on shore leave."

"Thanks, friend."

"I didn't mean—"

"Just get me a drink, okay?"

And Pinter shrugged. "Sure."

The request and its answer were their routine. It was a signal that the argument was to stop. Carruthers respected Pinter too much to risk the relationship. If only Pinter hadn't swallowed humanism hook, line, and sinker.

"Still," he thought, "if even Pinter feels that way, I'd better bloody well keep my thoughts to myself. I sure can't afford to let these clowns catch me in uniform."

Alpha Lunar Hospital was laid out in a quad. There was one dome each for Services, Housing, Research (and the hospital, what there was of it), and the R-works. Each of four passageways connected two domes. To get from his room in Housing, Carruthers had to pass through either Services or Research.

Services meant the cafeteria. No way. He moved into the passage toward Research. No one was in sight. If only his luck held . . .

He was one-third of the way down a side corridor past the labs when he heard, "Would you look at that?"

He kept walking.

"All dressed up like an Indian—I guess he figures the uniform don't show off enough of his body."

"I thought it didn't cover enough of it."

Carruthers moved faster. Temper, temper.

Almost clear, less than five meters from the interlock to the R-dome, he heard a female giggle. His blood chilled.

"I sure didn't know they made 'em like that anymore, I swear I didn't," a sweet Southern voice proclaimed, dripping of honey and sarcasm.

Carruthers' hand flashed to the thong at his waist, catching hold of the tomahawk tied there, as he whirled and let loose the war whoop he had practiced.

He saw eyes bulge as they took in his war paint, his muscles huge and tight against leather, his weapon—and his face. He took one step forward.

Heads jerked inside doorways like cuckoos recalled by the striking of the hour.

Carruthers surveyed the suddenly empty hall, his embarrassment transformed into victory. He grinned. "If only the Yatz would fall so easily."

He entered the interlock, passed through the final hall, and came to the doorway. He punched in his ID number; metal parted and he went in.

"That you, Rit?" Rushing said, glancing up. He gagged. "Rit?"

The contact man grunted a response.

"It's brilliant" the bureaucrat said.

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"Oh, Christ! I think it will work."

"It better goddam work."

"Right. Don't forget the glasses."

Carruthers nodded. The Yatz projection was always brilliant. But he'd noticed that Hun's pupils were wide in order to see him. "And don't you forget the spotlight."

"I won't."

Carruthers nodded and passed through another pneumatic entrance: Except for the unearthly looking R-works in one corner, the room could have passed for the studio of a Holo talk show.

He seated himself in a black leather swivel chair, turned his back to the camera, pulled a package of cigarettes from his breechcloth, and lit one. With the white cylinder dangling from his lips, he fitted his mirrored flight glasses. His free hand alternately clenched and relaxed on the tomahawk he'd made from pipe and a jagged Moon rock.

"Five minutes. Lobal interconnect functioning."

Power was surging through the station, he knew. Power that would burn through Carruthers' mind, then skip-leap across space. He could feel the sweat running from his eyes, making the nosepiece of the glasses hurtful, while smearing the war paint. He looked at the black mat on the back of his hand, and saw that its hairs were soaked.

The speaker crackled again. "Already?" he wondered.

"This is Inge. Good show and good luck."

"This is Adams, son. Say hello to Custer for me."

Thought Carruthers: "Screw you both with barbed-wire."

Inge was CI's civilian director of the lunar program—although this was the first time Carruthers had heard of him being on the Moon. Adams was director of "security"—all twelve battalions. Both had come to the Moon to view this contact, Carruthers knew. But how had they known to come? Could that peanut-brain Rushing have figured that Carruthers was ready to make a breakthrough? No. Luck. Dumb luck. But it made him nervous.

Silence.

"Ten, nine, eight, seven, six, five, four, good luck and go!"

Nothing and then the lights went down, the screen flickered on:

"Unsteady two-legged son of a tepid-blooded race—I see you return again to be taught your weakness. Such courage is rare for such a jelly-spined effluvium as yourself. Still, you cower in the darkness! Pathetic weakling, afraid even of his own shadow. Even now you would be carrion rotting in your own waste if—"

Carruthers' chair spun, hundreds of candlepower blazed over him, and he was on his feet, screaming into the camera.

The ten-meter-high vision of the Yatz, of Hun, decked out in full battle array, looking like Pancho Villa with a blue reptile's body, loomed in front of him.

A sound started somewhere inside

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the Earthman's guts, wrenching upward, reverberating along his rib cage, scorching up the trachea, and finally spewing from his lips: words of fury and slime, backed by the full fury of a man who could no longer stomach his own kind, but had turned the anguish elsewhere.

No one but Carruthers could've noticed the brief lapse in the alien's manner or the narrowing of the pupils; none but he had crossed so fully into the Yatz way of thinking. In that moment of exquisite confrontation, with the fire of R-contact burning in his brain, in the middle of chaos and curdled emotion, with sweat streaming from every pore, through eyes bloodshot with strain, Carruthers saw.

He saw, and he knew.

A grimace flickered for one glittering moment on the twisted reptilian face. The force of it ground its way

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through to the human's bones: It was a new gesture, a gesture of approval, and the contact was on.

Carruthers, in the Apollo, had killed his first whiskey.

"Another one?"

"For sure."

"You look lost, Rit," Pinter said. "You look like a cat that's been chased up a tree after meeting his first dog."

"I feel up a tree," Carruthers said. "But it's like all my life, I thought I was a weird dog, until I got chased up that tree. And there in the branches: cats. It's a frightening and beautiful thing."

"You've met Jesus or what?"

"Yesterday, I got through to Hun. You should've been there. Like a first date. Can you imagine what it's like working shoulder-to-shoulder with a race of Napoleons? A race whose every member was cradle-taught Nietzsche? Beethovens every one."

"Or Hitlers. Just how far away are these friends of yours?"

"You know, for a shrink, you show a streak of xenophobia a klick wide."

"How far?"

"Five hundred light-years, say. Out of range of possible face-to-face contact."

"But we can talk to them instantly?"

"Right."

Pinter beetled up his thick brows. "I hate to shake a zealot, but don't you think there's something awful damn strange about that?"

"Like what?"

"Like what are they getting out of this—other than a disciple whose initials are RC."

"Nothing, that I know of. I guess they're interested in primitive races."

"So they come on like, well, like Huns?"

Carruthers considered.

Pinter went on.

"Look, Rit, Beethoven preceded Nietzsche—the Nazis came after him. I respect where you're coming from, but you're wrong. Something's wrong, anyway."

"Come to the point."

"All right. You keep up with this super-race junk, and there's going to be trouble. People don't like it. All I'm saying is play it cool. Stay objective. Keep the hicks happy."

"But, hang it, what if they are a super-race? I owe my allegiance to talent. I believe in higher things, great things, Bigger than Life things."

"And it's made you cynical, bitter."

"So, it's my life. Sometimes, the intelligent man must choose unhappiness."

"What about the hicks?"

"They don't count. For nothing."

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"Rit, Rit . . . Listen to me. Your little 'tête à tête' would never have happened without the hicks. People like that tech guzzling down the bar there."

"Dammit, get me a drink. Leave me alone."

"Sure, sure."

The bartender brought the drink and then wandered to the end of the bar, where he began talking to the tech. Carruthers watched, jealous and angry. He felt betrayed.

He forced his mind back to the previous evening's contact, hoping to salvage his feeling of euphoria. He failed.

Several things were bubbling through his brain that distracted him and nagged at him. Pinter. Carruthers had played the tolerance game, and it hadn't worked. No one could say where intolerance was justified. And sometimes, it must be.

Other things. The contact. It had been contact, but nothing concrete had happened. Then there was the necklace Hun wore; he had an inkling of what the stones were; but he couldn't accept it, not yet.

Still, the sense of awe returned to him. The ferocious give-and-take had invigorated him and made him aware of the wonders of his own being alive. He saw that the Yatz had no respect for any but themselves. Their social evolution remained an evolution of the fittest. They presumed that life meant having the brains and guts and brawn to survive.

The Yatz were not like Earth's muddling millions, he thought. They had not sabotaged evolution by pandering to their infirm, or glorifying their weak, or diluting the strong. Carruthers only wished that the distance across the Milky Way was not impassable: Contact between Man and Yatz would be amusing—as long as it lasted.

Carruthers admitted to himself that he did not quite understand the aliens. As Pinter had pointed out, their motivation was not clear. Hard information, given freely at first, now seemed difficult to get.

But the contact man was not worried. No. There was an innate connection between him and Hun, a bond that transcended the R-link, an alikeness which denied mistrust.

In that was the promise of clearing up so many of the apparent contradictions the aliens presented. The solution, present but not yet grasped, would be something light and fanciful, like dancing under the Moon—something loony and significant. It would be as beautiful as the early contacts had been horrible.

But what? He shrugged. He didn't know. He sipped his whiskey and sputtered.

"Almost didn't recognize you with all your clothes on," Rushing said, seating himself at the bar. He took a napkin and fastidiously wiped clean the already spotless surface, before resting his long-boned, narrow arms upon it. "Pinter," he called, "would you bring me a beer?"

Carruthers asked, "You got a note

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from your wife, Rushing?"

"Don't need one. This is a celebration."

"Of what?"

"Why, of you, Rit. Of you and your ugly friend. Of the contact that will make us all rich."

Carruthers, surprised, suspicious, said, "How's that?"

"Hey, you don't know?" Rushing's look was amused, almost condescending. "You don't know," he said again, the words rolling out of his mouth with obvious pleasure.

"Don't know what?"

"You think all we get from the Yatz comes from the interview, but there's more. When you successfully make contact, secondary channels open up to us."

"Meaning?"

"Meaning, yesterday, we got a formula for a new alloy, one that's practically heat impervious—so much so, in fact, we could pass it through the Sun and it'd come out whole. A ship made of that wouldn't heat up enough to require an air conditioner inside."

Carruthers sniffed. "Big deal."

"It *is* a big deal. Do you have any idea how hot the Sun is? What a revision of molecular theory it takes to accept such a metal? Everything, but everything can change now."

Carruthers shrugged, feeling vaguely annoyed. He didn't know whether it was because of his own ignorance of science, or of his being used for other purposes and not knowing it. Or because Rushing knew more than he did.

"So congratulations," the bureaucrat said. "Our early projections indicate you may have just paid for the entire R-project."

"I want a raise."

"You've got it. Take some time off. The R-team will be working around the clock before the next transmission, just to get the early information sorted."

"It'll take me at least a week before I can go back to the studio," Carruthers said.

"I bet. The doc said the adrenaline you were pumping could kill a man. Heart attack, you know."

"It won't kill me."

"I guess not. You'd choke to death on pride, first."

"You got something important to say? Otherwise, I've got some serious drinking planned."

"I've got something to say."

"Say it."

Pinter arrived with Rushing's brew and put another whiskey in place of Carruthers' empty glass. Then, taking his cue from Rushing's hard stare, he slid back along the bar to where he'd been before, making a great show of turning his back. It was as if he'd hung a huge Do Not Disturb sign above the two.

"We've got to have some more information about the Yatz," Rushing said. "Adams says it's imperative."

"What else have you been telling me? I thought we were getting information."

"That's technical. Theory and stuff. And Adams is upset over the implica-

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tions: A race that could come up with that metal, that could come up with R-theory—maybe five hundred light-years doesn't mean that much to them. So Adams says we need to be thinking about defense, if only—"

"Defense? Against the Yatz?" And Carruthers threw back his head and laughed. "Tell the Fascist to ask Hun himself."

"It's your job."

"It's my job to maintain contact with Hun, which means it is my job to keep people from screwing up the contact. We start poking around, too quick, and click! No contact. And there go your hopes for any more Supermetals."

"You on their side?"

"I'm on my side."

"You're not indispensable."

"So fire me. You've already made me rich."

Rushing glared at him, then down into his full mug of beer. Silence. It was getting late. Shifts changed in the station. Men and women, most wearing the green suits of a tech or the red of research, drifted into the Apollo. With them came the fragrance of grease and rosins.

But most passed toward the action in the back. The 3-11 Bio crew had a party going.

The piano started playing, its notes strangely clear in the general confusion of the bar. The music was classical.

"Ah, Ludwig," said Carruthers.

"What?"

"Ludwig. Ludwig von B. Soc number, 801-463-3827. A good dude. You should get to know him."

"I'll look him up," said Rushing.

"You know, BS—I'm ignorant of a lot of things. But of nothing that's important."

Rushing didn't reply, not immediately. Finally he said, "What're you going to do about the Yatz?"

Carruthers thought about it. He hesitated to put a strain on the still virginal relationship. But it would be interesting, if he could manipulate Hun the same way that Hun had manipulated him. "Send me a memo on what Adams wants," he said, "Then, just pay attention to the next broadcast."

"Thanks, Rit. It means a lot—"

"Yeah. I know. It means a lot to your career."

Silence. Rushing said nothing. He looked at Carruthers, not glaring, his eyes open, blinking. But he said nothing. Then he got up and left.

Carruthers revolved on his stool. He watched Rushing go. He almost liked Rushing. Bad sign. His attention turned to the piano. A woman's back. A pool of light made a halo on her hair, The "Appassionata," first movement: strange music for a bar: strange and beautiful.

He watched, listened, enjoyed.

When the movement finished, he clapped lightly. The pianist turned to him, radiant, and then she laughed. It was Emerson. His skin began to burn, and he got up, and he headed toward the exit.

"How!" Emerson called out.

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He cursed. As he left, he banged a shoulder against the doorjamb. It hurt. The light in the hall was neon. Stepping into it, he felt chilled as if going into a winter's night. He held the thick, dark wood of the Apollo's door open, and hoped for a resumption of the music.

It did not happen. The woman began making the ominous rumbling of wardrums with her instrument. Carruthers shivered and released the door. The shucking sound of its closing cut off the further music, the laughter.

Sleep, dammit.

But he could not sleep. His eyes, scarcely able to stay open, would not close. The ceiling revolved above his sweat-soaked body. He ached.

Sobering up, he thought mechanically. But that didn't seem to matter much: Lately, the line between in- and un-intoxicated had been blurred.

Carruthers felt a loneliness that was new to him. Rushing knew science; Emerson knew music, and what did he know? An image, a suspicion, of Emerson and Rushing together. It sickened him. Always they went to the morons.

But Rushing was no moron.

The Yatz were the only fit company in the world. He laughed at the irony, imaging a Yatz coupling. Imagining himself as a pioneer in miscegenation. He sickened again.

He was lonely. So stupid, so insignificant, so human. He was not worthy of the Yatz. He was always alone, but never like this. He needed to communicate with someone, and the urge could not be held until the next R-contact. Blood roared in his ears with the beat of wardrums.

He thought of Hun, imagining the leathery face hovering above him in the darkness, and something, far beneath his cynicism and his discipline, trembled.

His eyes shut to blank out the alien's face.

Colors drifted across the inside of his eyelids, calming him, lulling him, making him sleep. But sleep only sharpened his understanding, made crystal the mist of hurt and loneliness. *What happens to the superior man who can no longer claim superiority? He returns to the herd.*

He dreamed of a marionette with a Yatz face, suspended by a long silver cord that ran up through the black Moon sky to wizened hands. He saw himself, Indian of the maria, seizing the ragdoll figure and shaking it, making a fine line around the top of the skull with his tomahawk, and pulling free a scalp of crepe hair. Spirit gum bled onto his hands.

Laughter surrounded him; laughter needing no air, but coming to him by R-implant; but it was laughter with hard edges and cutting places, human laughter, laughter at his victory.

He slashed angrily at the cord supporting the puppet and it would not cut. He grasped the body and tried to hurl it back into the sky, but it only fell back to dance grotesquely decimeters above the lunar surface.

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Wakefulness dawned over the scene, and Carruthers felt the cooler part of him note that his cheeks were wet, that the laughter had been his own.

For the first time, he thought about going crazy.

He found Rushing having coffee with a couple of silver-uniformed executives in the cafeteria. As Carruthers approached, their talk stopped. A thin man with an angular face arose and said, "I've got work to do. I'm sorry, Tim." His hand lightly brushed Rushing's shoulder as he stood. The other exec followed.

"Finally, I've found you," Carruthers said. "I should've known. I've been waiting on that memo."

"Later. I can't talk now."

"Later, hell. I'm doing you the favor."

"Rit, I don't need your favors. You'll have to take responsibility for it yourself."

"Listen, Mr. Paper Shuffler—"

"No, you listen," Rushing said, rising to his feet. His eyes stared directly into Carruthers'. Only the features of his face reflected the intensity of his feeling. The soft sparkling of his eyes was now a flashing. His smooth chin was jutting and hard. "I've had it with you, with you and your lizard and your whining. The Yatz aren't the only damn thing in the world. You've paid for yourself. The project is paid for. Everything else is cream. We can take the loss.

"What we can't take is a drunken SOB who is fouling up station procedure with his whims."

The tight lips asked, "You understand?"

Carruthers didn't, couldn't respond. He watched, speechless, as Rushing turned away and began walking. The shock passed. Shaking his head in astonishment, he started after the supervisor.

A powerful hand seized him by the upper arm. Unthinking, he tried to twist free and, when he did, cursed: His captor was Pinter.

"Let me go."

"Just wait one minute. Tim's wife has been critically injured in a flitter accident. She was visiting her folks Earthside. Tim can't get down there to see her. He can't, because CI has ordered him to stay here. To watch you. You're too unreliable to be left alone, they say."

"Me? Christ, the whole program rests on me. And if that twit thinks . . ."

Pinter only watched Carruthers. And Carruthers felt the observation, and listened to what he said. "I'm sorry. I didn't know. If I had known—"

"You'd have done the same thing," Pinter said. The grip on Carruthers' arm tightened, then fell off altogether. Pinter walked away.

Reviewing the videotapes took time. But the anthropologist had determined to spend the rest of the days until the R-transmit hidden away among the gray files in the R-dome.

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Here was meaning, meaning and some semblance of peace.

He examined film until he thought his eyes would burst. He listened to tapes until the gutteral English of Hun ran together in his ears. The ozone smell of the great computers and the other electrical works seemed the only smell he knew.

He substituted calisthentics for the strolls on the Moon surface. He stopped drinking.

Repeatedly, he called the library—having found he was too stupid even to use the computer-retrieval system. Too much of the information from the secondary tapes was beyond him. He was muddling over the difference between A-type and G-type stars, when there was a knock on the door of the file room.

"Come in," he said, half-afraid, half-hoping it would be Pinter or Rushing.

It was not. At first, he didn't recognize the gangling male with unruly red hair. It was a technician he'd seen often in the Apollo.

"You the joker who's been driving Basil crazy?"

Basil was the librarian. "I am. But what—?"

"Then you need my help. You work with the Yatz, don't you?" He extended his hand. "Rit, isn't it? Rit Carruthers? I'm Will Abernathy. Mind if I sit?" He eased himself slantwise into a chair across from Carruthers.

"I'm sorry. I'm very busy. I—"

The intruder waved away the protest. "With my help, you'll save enough time to spend a few minutes. I've got clearance, too, so don't worry. See, I was in the library and Basil, the old carp, was just a-carryin' on every time you called. It got me interested, so I checked, found out who was calling, and came on down—after I got the CI paper mill to approve it. Okay?"

Carruthers nodded dumbly. He disliked nice people. The hail-fellow-well-met, he hated. But . . .

Abernathy said, "I've sure been wanting to meet you. I've heard loads about your work and you—you let the CI big shots know exactly how big they are, don't you!"

Carruthers smiled, slightly. Maybe this Abernathy could be of some help. "Well, thanks and all, but I can manage."

"No. You need help. You want Basil running over here to bean you with the Unabridged? No, no. No need to be embarrassed, though. Like my grandad used to say, 'Don't waste a coon dog on no rabbit'."

He reached across the table and took the folder Carruthers held. He glanced through it. "This stuff's tricky. So give me something to brag about. Let me help."

He shut up—finally—and began reading.

Carruthers studied him. Funny guy. He decided to risk it. "I'm trying to understand what the facts about G-type stars mean. I understand the facts, I just don't understand how they fit."

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"Why do you need to know?"

"The Yatz have one."

"So do we."

"Really? That's odd. I thought 'G' had something to do with temperature."

"For sure. They heat up between forty-five thousand and six thousand degrees Kelvin."

"But the mean surface temperature on their planet is supposed to be about eighty degrees Centigrade."

"No problem at all," Abernathy said. "I bet their year's a lot shorter than ours."

Carruthers shook his head. "It's not. In fact, the twelve-plus days between contacts are roughly one of their weeks. and there are sixty-three of them in one of their years."

Abernathy blinked. "Son of a river rat. You sure?"

"Yes. It's here . . . somewhere." Carruthers began shuffling through the papers on the desk in front of him, while Abernathy began working on his watch-calculator.

The technician took sheets from Carruthers, thumbed through them and occasionally fed figures into his machine. He frowned, repeated the process. He whistled. "That's just weird. Where's the stuff you've got on their atmosphere?"

"It's only hypotheses."

"Hmmmmm." Abernathy studied the papers. "Well, you'd have to figure their air's butter-thick, with enough carbon dioxide to produce one hell of a greenhouse effect. Or else their sun is the unlikeliest candidate for a G-type star I know of . . ." His pen made a staccato noise as it tapped against the face of his watch. "No. Impossible." He glanced at Carruthers. "You figure it took them as long to get civilized as it took us, and you figure they've got a *big* A—type star."

"I don't follow you."

"What I'm saying is, they're damn lucky their sun hasn't gone pffft. It must be overdue to nova."

"Meaning?"

"Meaning if the magnitude's what I think it is, meaning their planet's an ace candidate for a molten graveyard. Those figures can't be right."

"Or . . ." Carruthers said, softly.

"Huh?"

"Or somebody's lying."

"Them? But why?"

Carruthers shrugged. "I don't know. There're some things that just won't get straight. Maybe if we could figure out about where this star's supposed to be . . ."

Carruthers found out a lot of things that he didn't know, some of them important. Abernathy helped not so much by clearing up problems, as by showing where the real problems were.

"Thanks, Will."

"My pleasure. It's not often I get to play expert with my hobby."

"Your hobby?"

"Shoot, yeah. I'm in transport, remember?"

"Oh, yeah."

Abernathy's departure left Carruthers with a feeling of reinforced igno-

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rance. He stared thoughtfully at the wall. Then he reached for the report on the Yatz's alloy.

It seemed the logical place to go.

After all, as Abernathy said, there was at least one report of a nova the Chinese had seen from the direction of Cassiopeia. It had been some five hundred years before. If R-transmission was indeed instantaneous . . .

Two days before contact, hurrying down the hallway through Research, Carruthers met Rushing coming out of the interchange.

"Tim," he said. "I hope your wife's better."

The little man seemed not to hear. He made a move to pass on by. Then he said, "She may live. Might. Her life, hers, worth so many more than—" And he looked at Carruthers. Then he went on down the hall.

And Carruthers knew what Rushing had wanted to say, and he could understand, and he himself felt like he must be worth less than this woman he had never seen.

But he could not change his past.

He turned his conscious mind to his latest findings on the Yatz, and he hoped that his guilt would submerge into his subconscious and drown there.

He had found what he was looking for in the films, and it disturbed him. Too damn consistent, he thought as he watched the Hun on the holos. Almost too consistent to be acquired.

But that was impossible, he told himself: The gestures were neither social nor automatic; there was no other explanation than idiosyncratic.

He sighed to himself and kept working. At midnight on the eve of contact, he switched off the viewer, lit a cigarette and settled back into his chair. He felt good. He was on the brink of understanding the enigma that the aliens presented. It had to be one of two things, and one was impossible. The other was only unacceptable. Tomorrow would decide.

That thought pleased him. Hun can controlled the Earthman's actions to this point, and CI had harnessed the rest with its rules. "That's all past," he told himself. "Tomorrow, I'm in control. I'll make the rules."

He realized his own error in measuring his own worth against that of the Yatz; but he saw, too, that the past could not be changed. Only success could free him.

Only freedom could give him success.

Carruthers caught his breath at the sight of the grotesque image, then smiled. He had applied the war paint so perfectly that he loathed the reflection of himself which appeared on the shiny metal of the door to the R-dome studio.

At his back was Rushing, who had not looked up as Carruthers entered. Pinter was here. Surprising. Again, Rushing had anticipated what the contact-man was up to. He knew this time that sanity was at stake.

But when Carruthers asked Pinter to have him a drink ready when he came out, the bartender turned away

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without answering him at all.

The mirror image split suddenly as the door parted and the Indian passed through it.

He'd been winning and he had known he was winning. He saw Hun had realized it too. That was when it happened, a puffing sort of explosion that went off in his brain. It had come from the R-implant.

Then silence. Blackness, too, and numbness. There had been void as long as Carruthers was able to remember. But sight, hearing and touch were drifting back to him in the guise of a nightmare, a dream state to which he had forfeited his mind.

He thought he saw himself stripped naked and on the surface of the Moon. Stars shone steadily, piercingly. The vacuum on his skin caused it to shake as a horse's does to frighten flies.

But death did not come as he expected, only death-agony. He tried to scream with the no-air in his lungs. New constellations formed above him, one with the face of Hun.

Then the face became real, grew a body, appeared. The Yatz laughed.

Carruthers could imagine Hun broadcasting to another race. He noticed the lizard had added two stones to the horrific necklace he wore.

But not two stones, he knew.

What's the custom? he thought wildly. They cut off . . . ears? Blackness and silence rushed back over him, protecting him, but still he sweated. He groped his way back to vision, forcing himself to see and think of the neckpiece. *Stones, but not quite. And there are two new ones.* He thought, *Two.* His gut twisted on itself, seeking to plunge him back into hiding. *Two of them. Two of mine. Curious, bean-shaped things. Bronzed. Something very like testicles. Something very like mine.*

He tried to scream and was successful. Because he could do it, the leftovers of Carruthers knew him not to be dead. He shaped the sound into a war-whoop.

He began to run after the phantom Hun, and the Moon's surface cut into his bare feet like glass. He heard laughter and breathed it for air. This chase, he knew, was a parody of one earlier, when Rushing had dispatched men after him.

That had been different, he thought.

That had been sane.

Carruthers continued his sidereal pursuit, a naked man plunging after a armored lizard that took thirty-meter evasive leaps. But the Earthman felt his bronzed arms stretching out in front of him, his fingers elongate and white, growing talons. They missed, grabbed hold, and tore at the alien flesh. But not the leather he'd expected—cloth. Cloth and balsa and strings.

The thing dissembled slowly, pieces falling dreamily in the light gravity. The anthropologist shook his head mournfully over the shattered figure and said, "Dammit, gestures are supposed to be idiosyncratic!"

One act only remained: He reached for the cord suspending the puppet's

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remains, wrapped them around his hands and heaved downward. The wirelike cord cut into his flesh and blood boiled from the cut. A curtain rose across the pinpricked sky; and a machine cowered, blew a fuse.

Loneliness rushed over him as it was done.

It was the unacceptable, he said sadly.

Hun asked, *Are you sure?*

The loneliness was gone.

You understand what kind of manless man you are? Hun asked.

A man, Carruthers said.

And what comes before acceptance?

Revulsion.

Before love?

Hate.

And before righteousness?

Righteous indignation.

Very, very good. You may live, Hun said.

Words tumbled around him; they clambered noisily in the thick fresh air. He breathed deeply of the air's cool reasonableness. The air was good.

"I've got it," he said pleasantly, thinking of the impossible. "Now what am I going to do with it?" His friend said, "You should lie until you understand the truth." Carruthers giggled to himself and told the world, "I hurt."

He could feel the blood pooled beneath him.

But not blood, he thought. *Sweat.*

Cold floor and sweat beneath him.

He smelled himself. He made a good honest smell—the rich, sharp stink of fear.

Carruthers opened his eyes and saw a curious half-moon above him. One of the Moon's eyes was swollen as if it had been hit. It looked purple.

"Hun?" he asked. He brought his hands up and looked at them. They were unmarred. He took his hands down and saw the moon was Rushing. He watched as the mouth made the words, "You all right?"

"How's your wife, Tim?" he asked.

Someone said, "He's gone crazy."

"I need a drink."

"He sounds normal to me."

Immediately a glass pressed against his lips and a force (a hand?) lifted his head. A familiar bitterness touched his tongue. The liquor tasted of salt.

"What's your name?"

"Rit. Rit like the dye. Rit."

A smile creased the face above Carruthers. But the crease deepened and the purple of the eye spread swiftly across the skin, while the nose swelled and turned to chitin.

Words again.

"Some memory, anyhow . . . shock, but not . . . God, did he hit me! . . . something, something . . . got balls . . . wasted . . . rotting in waste . . . carrion rotting in your own waste if—"

Carruthers screamed.

Hun said, "It's to be expected. Reality is always a shock."

"What happened?" Carruthers

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asked, a long week later.

"You've been out for a while. Feel okay?

"K-O'd. You mean, nuts?"

"Well, yes," Rushing said. He looked the same as when he'd told him CI wanted an SOB.

"Your wife's okay," Carruthers said. He said it as fact.

"Why, yes. She's fine."

"Good," Carruthers said. "I take it I'm under wraps?"

"Just for a little while. You're classified."

"As what?"

"As a human being, right now. If you're ready to talk, it'll end that much quicker."

"Fine."

"Just a minute. I'll be right back."

Rushing left and Carruthers began smoking his way through a pack of cigarettes. On the third one, he gagged. He stubbed it out. No need for that, now.

Footsteps came down the hall. Booted steps. A voice ordered guards into position.

Inge, Adams, and Rushing came into the room.

Pleasantries exchanged.

Finally, "You're going to think I'm nuts," he said and grinned. "But then you thought I'd be, anyway, didn't you?"

None of the three reacted. Carruthers decided maybe they didn't know. Okay. He said, "How come none of our bright boys could tell this deal was a fraud?"

He told them the lie that would prepare them for the truth: He told them the unacceptable, not the impossible.

He said the Yatz broadcast, which was nothing more than a computer-designed projection of a statistically normal Yatz individual, was likely being beamed from a dead planet. "Remember that protocol of insult I told you about? Well, I overlooked another explanation than the one I gave." Actually, two. "The insults were rules to a game, designed to limit response. See, a computer can't play against unlimited variables. But with specific limitations, a computer can come up with a quite realistic response."

Three blank faces stared at him. He knew that Hun's advice about the lie had been the truth.

"I had to operate within a narrow category of insults." A little light showed in Inge's eyes. "Exactly," Carruthers said. "The computer could play only one game. It could have been chess—I would still have had to learn chess before I could play the game. Then I would think my opponent was human."

It seemed to sink in. "The giveaway was consistency. Hun's gestures were too ordered to be spontaneous."

It took, over a week's time, eighteen packages of Marlboros (you don't quit all at once), two fifths of Jack Daniels, a good-sized tantrum from Adams (who, Carruthers thought, was more upset by the fact the Yatz couldn't be warred against than anything else) the services of Will Abernathy, a LO-

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GAN 1600 computer, and as many questions as answers from the anthropologist before they believed him.

"You mean it's all fake? All of it? The alloys, the R-transmitter?" Inge asked. He looked terrified.

Carruthers laughed aloud. He knew what Inge must be thinking: How was he going to explain to the Board of Directors that he blew a billion credits on a puppet show?

"No, not that," he said. "The facts had to be genuine—they were the bait. We got the best of their technology because we were willing to listen to 'em bitch. The cybernetics, the R-theory, the alloys, all of it was the best they could produce before their planet was destroyed by nova or supernova."

"That's absurd," Adams said. "If they're all gone, where do the signals come from?"

"I've been told that the heat resistant alloy is hard to produce. I guess they produced enough to shield their R-facility."

He added, "And only that survives." The whole truth would be better. But it would take years of preparation before it would be understood.

Adams seemed satisfied, but Inge's face had clouded over. Carruthers tensed, preparing himself for the question to come.

"But why bother? Why'd they do it?"

As a warning, he wanted to say. Carruthers shrugged his shoulders for Inge's benefit. He noticed that his finger was already yellow with nicotine; Hun would be critical. A hole had been burned in one of the sheets.

"I can only guess," he said finally. "Suppose the Yatz were extremely vainglorious." Yes. Let's suppose that. "Suppose they were so proud of their achievements that they couldn't stand to see them ended." He paused again: Yes I can understand that. "Maybe they thought by giving gifts—but at a price in honor—they'd earn the respect they could never enjoy."

He looked squarely at Inge. "But we may never know. The lode seems mined out. It looks like the Yatz episode is closed."

And, inside himself, Carruthers heard this:

Such a skillful liar! I am pleased. You will make an excellent diplomat.

Thanks, friend. Now bug out and let me finish.

Adams looked uncomfortable. Inge looked embarrassed. Only Rushing had the guts to ask.

"What happened to you?"

Carruthers laughed. "I caught on and the computer knew. I imagine it tried to give me a prefrontal lobotomy with the R-implant. Something along that line probably happened to Sylas and Montgomery." He thought, *Only they chose it.*

"Did you know it would happen?"

"I knew there was a risk. Maybe the only way to win in this world is to go off your rocker. Maybe not."

Silence filled the room, broken finally by the silken rustling of Inge's pants as he stood up. "CI thanks you

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for your work, Carruthers. There'll be a bonus."

"Glad to do it. Next time you need a patient for this classy little hospital of yours give me a ring."

Adams looked grieved. "I don't know," he said. "These corporate governments aren't much on rewarding bravery. I sure think you deserve a medal." He stood up and walked to the patient's bedside. "But, boy, I'd sure like to shake your hand."

He did, and Carruthers said, "Thanks, General. But I've already got my medal." He tapped the left side of his brow, where the R-shaped scar showed.

The man left.

Rushing looked nervous.

"Well, good buddy, what happens now?"

The supervisor smiled, as if it hurt. "I've got my job to do."

"So do it."

"You are to take the next shuttle back out to Earth and your employment with CI, as well as salary, end upon touchdown. Your duties, official and self-imposed, terminate at this moment. You are reminded that paragraph VI of your contract binds you to silence for one year, with CI holding an option to buy your silence for an acceptable sum the next five years. If you violate this trust, all monies will be forfeited by you and criminal prosecution will ensure."

Carruthers whistled. "And you learned all that for me?"

Rushing shuffled a bit. "For myself, I just want to say I accept your apology. You've done a good job."

"Tim . . ." Carruthers said. "You've got it wrong. *We* did a good job."

And the bureaucrat beamed.

Already drinking, but somehow blocked from getting drunk, Carruthers arrived at the Apollo Lounge soon after it opened. It was 11 AM GST. The bar was empty, except for someone in a corner, a darker shadow among the shadows. He paid no attention.

He seated himself. Pinter brought the regular.

"You're going to make a day of it. I can tell."

"I already have, Pinter. I already have." He took a speculative drink of the whiskey. "You ever wake up and realize you've made an error, only this time it was a big one, like maybe with your whole life?"

The bartender chuckled. "Every Monday."

Carruthers smiled. He brushed a smear into the condensation of the shot glass; green light played through the amber liquid. He realized he didn't want so much to drink, as to talk. He'd come to the Apollo to apologize to Pinter.

"Say, what were you doing in the R-dome at the last contact?"

"Vulture instinct. I know when my patients are ready to crack. The funny thing is, they drugged me out of remembering any of it. Top secret, they said. I'm dying to remember

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what it was I saw," Printer said.

Carruthers laughed. "Put it this way: You remember telling me I looked like a cat that's been treed by a dog?"

The aproned man nodded.

"Well, if you'd been watching, you'd have seen me climb back out of the tree as a dog."

Pinter scowled. "Thanks. That tells me a lot."

"Sorry. Top secret, you know." And not only by our side. "What I really wanted to say was, 'Thanks for being there.' I'm sorry I've been such a pain."

The bartender toweled out a couple of tall glasses and racked them. He smiled, but not as if he were responding to Carruthers' statement. "Mondays are rough, all right," he said. "Beginnings and all of that. But you can't avoid the gut feeling that the pain will go away, that there's work to be done, work that you've got to do. Good work, but risky."

Carruthers stared at him, curious. Just how much did Pinter know? How much had he guessed?

"Rit, you look happy."

"I am friend, I am."

Behind him, the piano began to play. Beethoven. Pinter looked at the anthropologist and winked. He walked away. Carruthers turned around.

Inside him, this voice: *It's okay. We have time. Do what you have to do. Love is a good training. Love is a diplomacy all its own.*

And Carruthers grinned, outwardly. The R-implant warmed him, did not burn. Helped, did not hurt.

He turned on the barstool and watched the haloed, brunette pianist. He watched her play, then got up, needing to follow the strains of Beethoven to their source.

It was a celebration of being alive, he thought. He no longer could make himself alone. He breathed air laced with her perfume, felt the good tickling he had ignored for years, and tasted his lips nervously.

The walk across the room took a terribly long time. Carruthers felt awkward, as if needing to plan each step before he made it. He stopped once, thinking to go back for his drink. But then he went on, not stopping until he felt the warmth of the musician's shoulder against his palm.

The impassioned arrogance of the old composer poured from her fingers. Her nails shone like stars in the dimness. The cords of muscle in her back danced under his own hand.

Carruthers understood something in that moment, that Beethoven's arrogance came in his creation. Not in his snarls and not in hatred and not in bluff, but in the doing of beauty.

It was as the Yatz taught.

The music ended. Emerson looked up.

"How!" Carruthers said, lamely.

Emerson smiled. It was a smile echoed five-hundred light-years away, on the face of an armored reptile who, alone, kept the R-works going. He, too, had been lonely.

But not any more. ■

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BY SPIDER ROBINSON

the reference library

A House In Space, Henry S. F. Cooper, Holt Rinehart & Winston, 184 pp., $8.95
Up The Walls Of The World, James Tiptree Jr., Berkley, 319 pp., $8.95
Strangers, Gardner Dozois, Berkley, 191 pp., $7.95
In The Ocean of Night, *Gregory Benford,* Dial/James Wade, 336 pp., $8.95
The Compleat Feghoot, Grendel Briarton, Mirage, 86 stinkers, $4
Critical Mass, Fred Pohl & Cyril Kornbluth, Bantam, 180 pp., $1.75
Gordon R. Dickson's SF Best, Dell, 236 pp., $1.75
The Art Of Science Fiction, Frank Kelly Freas, Donning, 120 pp., $7.95
The Time-Swept City, Thomas F. Monteleone, Popular Library, 287 pp., $1.50
Book reviewers tend to be manic depressives.

For one thing, they have to work too fast. A column's worth of books takes at least a week's working time to pass before your tortured eyelids; the column itself takes at least as long to write and type and proof; and then you have half of each month left in which to attempt to earn a living wage. (They pay Lester and me in John Campbell autographs.) You catch yourself approaching a new book with an attitude of, "Okay you son of a bitch, *entertain* me! And make it snappy!" You *know* you wouldn't want your own books treated that way, but you can't help it. If, halfway through a book, you're having a rotten time, you must finish it anyway (and make it snappy) so that you can earn the right to tell people *why you hated it*—there's no time to dump it altogether and start another book.

Worse, we're in Boom Times. 1977 *Locus* figures are not out yet as I write, but I will be astonished if there were less than a thousand sf and fantasy titles published last year. Call it a hundred books a month. Apply Sturgeon's Law to that figure, and it's evident that the chances of finding ten books a month worth discussing, let alone recommending, are poor.

You find yourself doing brilliantly caustic hatchet jobs on books that didn't deserve the space. And perhaps worse, you find yourself overpraising the occasional merely adequate book—when someone finally does *show you a good time, you decide it* must be love ("The shoes a Lord rejected are a godsend to the churl/ And an immie in the sewer looketh mighty like a pearl.")

But the law of averages doesn't forbid inside straights; it merely discourages them. When, for once, random chance deals me a whole column

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full of books that I can honestly recommend to you as worth their purchase, a kind of threshold effect cuts in and takes me right off the emotional rollercoaster. It gives me enough perspective to intelligently discuss their flaws at length, without being afraid of scaring them away. The perfect book, after all, exists only in Plato's World of Ideals (and of course in my mind every time I sit down to write one), and your funds may not be unlimited.

The first book in line is damned close to perfect, though.

Well, perhaps that's not fair. It's not a work of fiction; different rules apply, perhaps less ambitious ones. This is book-journalism, a book of science fact closely related to science fiction, and it only needs to be readable. I can only tell you that I enjoyed it so hugely that I have mutilated my review copy nearly beyond recognition.

I saw an ad for it in Analog a few months ago, and I happen to be currently co-writing a novel for which it looked like a useful reference (based on "Stardance," April '77 Analog), so I sent for a copy. As I read, I underlined passages relevant to my purpose, and dog-eared the upper corners of those pages for reference. Before long the poor book looked like a sophomore's copy of Gibran's *The Prophet*: every word in the book underlined, every page dog-eared. I started dog-earing *bottom* corners to mark off sections I wanted to quote in this review—and the same thing happened. I mean, I found myself underlining the *pictures*.

What it is, you see, is **A House In Space,** the story of what it was like for nine men to live for periods of up to three months in zero gravity, in Skylab.

Two billion years we've spent evolving in a one gee environment. So has every life form we know. The previous free-fall record of 25 days has been set by 3 Soviet cosmonauts—who *died* upon their return to Earth, "under circumstances American flight surgeons had not felt were satisfactorily explained. Yet the first Skylab mission was to last 28 days, the second 59, and the third, originally planned for 56, would be extended to 84." There was at that time no evidence to suggest that it could be done. Did you know that? Oh yes, and there was a mutiny of sorts during the third mission, did you hear about that?

And do you really think that, as a science fiction reader, you have a fair mental picture of what free-fall life is like? Literally hundreds of writers have sent their imaginations out into space, looking for those homey details of extrapolation to lend verisimilitude to their stories—could they have missed much? Damn well told they could. Did you know that the prudent astronaut fetches all the horseradish and Tabasco sauce he can afford? Smells don't travel well in a low-pressure atmosphere, so the food tastes bland—and you can't salt it to taste: granules are obviously useless and a saline solution tends to dry and plug the nozzle (actually what I mean is, there *is* no saline solution).

Not (author Henry Cooper, Jr. makes clear) but what NASA could have profited by asking, say, Ben Bova and Isaac Asimov to be design consultants for the missions. The members of all three Skylab crews complained,

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often and lengthily and bitterly, about the design inadequacies of their house in space (well, they were *instructed* to), and Cooper passes along the beefs with minimal laundering. NASA, for all its billions and brilliant minds, failed to think through the requirements of free-fall living as thoroughly as the average sf fan does for fun by age sixteen. Small example: the water tanks were pressurized *with air*—which in zero gee refuses to collect up at the top of the tank. Result: When astronauts injected their dehydrated-food bags with the necessary water, the bags frequently exploded, worse, carbonated drinking water created self-propelled astronauts, farting their way through space ("So what exactly do you guys *do* up there, anyway?").

What struck me the most, I think, was that even these men, whose faithfully-recorded dialogue makes them seem the most unimaginative and insensitive jocks NASA could possibly have assembled, all came back from their experience suffused with planetary consciousness. They found that the *only* land mass they could recognize on sight was South America's tapering foot, and that *no* land mass seemed to show much sign of life: their overwhelming and unanimous impression was of vast godforsaken wilderness with very occasional tiny checkerboards and twinkles. "Similarly," says Cooper, "Carr got concerned about air pollution in a way he never had before, for when he looked out the wardroom window toward the Earth's horizon, where he could see the atmosphere edge-on as a narrow arc, he was startled by how thin it was—it was, he said, like the skin on an apple."

I could go on about this book forever—seem to be doing so. Cooper, a staff writer for *The New Yorker*, does an unspectacular but thoroughly competent job of arranging a million fascinating details into a readable and entertaining array, and manages to make all three crews, Skylab itself and NASA *itself* all come alive on paper. Make no mistake, this is no NASA puff-piece: Cooper tries to present both sides of the mutiny fairly, but it's no secret where his own sympathies lie. Even so, NASA supplied him with 31 pages of photographs so splendid that I'd seriously recommend you spring nine bucks for the Holt hardcover. I haven't seen the planned Bantam paperback, but I don't see how those photos could be shrunk without losing a lot. In any case, buy one or the other: I rate it the most absorbing science fact book I've seen in the last year. And boy is it going to help me with that novel.

One tends to approach a first novel with some trepidation (perhaps even more so if one is its author; but that's—no pun intended—another story). It doesn't even help much if the first-novelist is already an established Name; sometimes it hurts. Short story or novelette writing, even novella writing, is a completely different skill; a gift for songwriting does not make one a composer.

But it sure doesn't disqualify one either—and twice this month I have seen the trick pulled off with resounding success.

And I read Gardner Dozois's first novel under the worst possible conditions. **Strangers,** you see, is one of those books that stands or falls on its

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blockbuster ending—and the PR flyer Berkley sent me, inviting me to order a review copy, explicitly and inexplicably gives away the entire ending! This of course colors my evaluation of the book: all that lovely misdirection wasted, all those subtle clues exposed. All I can say is, I had a good time anyhow. Fortunately Berkley sf editor David Hartwell makes no such blunder in his jacket copy, so as long as you can evade Berkley's PR department you should have an even better time.

Even under the best of conditions, the book has problems. It is essentially a story of interspecies love, the ultimate miscegenation, and the tragedies that result therefrom through lack of understanding, through failure to communicate. This necessarily involves a protagonist difficult to like, self-involved, unimaginative and neurotic. It is hard to grieve for him overmuch—and yet if he were more likable the plot would collapse.

And, of course, the worst thing about tragedies is that they're so damned tragic. Gardner has always written more (and better) about pain than about joy, and there's very little of the latter in *Strangers*. Just barely enough, in fact, to lift that schlemiel protagonist high enough to have someplace to fall from. The book might be said to end on a hopeful note—but then it might also be said not to. You want to save this one, in other words, for a time when you don't mind being depressed (if you can afford such luxuries).

Nearly as bad, the blockbuster ending is one that I've seen several times: Phil Farmer used it back in the fifties, and I don't know for sure that he invented it either. You may guess it, or you may find it a bit too pat when it is revealed to you. On the other hand, I *knew* what it was, and still enjoyed the book.

So with all these complaints, why did I start out talking about "resounding success?"

Well, for one thing, if you like to read good writing about pain, you can scarcely do better than *Strangers*. Gardner's empathic ability is so finely tuned that one wonders how he can bear it, and his craftsmanship is excellent, rich in the nuances, textures of pain—both human and alien.

For another, few people can construct an alien world, society and milieu better than Gardner; Weinunnach is one of the most fully-realized worlds in my experience, vivid in sights and sounds and smells and shades of emotion, and peopled with plausible characters so achingly *almost* human as to break your heart.

It's the control, I think, that impresses me the most. There are literally thousands of threads in this tapestry, and every one of them was put there for a purpose, and each is where it belongs. Whether the tapestry will fit your wall is moot, but I call your attention to its exquisite workmanship.

I haven't seen the original novella version that ran in Silverberg's *New Dimensions* series, but I'm told that this is not more than 5 or 6,000 words longer, and I can tell you that I found no fat on it anywhere. It's short for eight bucks (191 pages, printed on heavy weight paper to make it seem larger), but then the whole notion of buying art by the pound is silly.

Gardner is a novella writer, writes

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almost nothing else but novellas (economic suicide; artistic satisfaction). *Strangers* started out to be a rather long novella, and was encouraged to grow, quite painlessly, into a rather short novel.

James Tiptree, Jr. also is a novella writer, but **Up The Walls Of The World** is quite a different proposition. It is a rather long novel, a whole different kind of writing than anything she (is there anyone left out there who didn't know that Tiptree is a woman?) has done before, and a clear triumph on anybody's terms.

You know the lovely device of telling two apparently unrelated stories *side by side, in alternating chapters*, and then bringing them together suddenly at about Chapter Twelve? Sure you do; the best example that comes to mind is William Goldman's brilliant *Marathon Man*. Well, Tiptree (a little tip: I first-name writers who are personal friends, and last-name all others, stranger or enemy. I have lots of pals in this racket, and perhaps you have a right to know which ones) decided, for pure swank, to start out with three major threads, apparently *unrelatable* at first, and then tie them together into a mind-boggling package. She pulls it off with the breathtaking ease of Fred Astaire making an anatomically implausible step look simple. Three different typefaces are used to help avoid confusion, but Tiptree is so good a writer that they are actually superfluous. Two lines into any chapter and you know just where you are—and what was happening on this channel when you left it last.

And what you have here are not just three subplots, or just three different worlds, or even just three different (literal) species of protagonist—but three different planes for existence. Channel One brings you a being, an "evil presence," so vast that it steps on solar systems, yet so subtle that it can perceive individual electrons, vagrant thoughts. Channel Two brings you a sort of aerial jellyfish named Tivonel, a telepathic female whose race lives high above the surface of a far distant planet, and is being threatened with destruction by the baddie on Channel One; she is utterly alien, and one of the warmest, noblest characters I've ever seen. (Don't ask *me* how Tip does it.) Channel Three brings you Dr. Dan Dann, an MD attached to a parapsychology research project funded by the US Government: shattered by personal trauma, Dann is addicted to his own drugs and plagued by an unwanted and inescapable talent for empathy. (I should mention that the villain on this last channel is one of the nastiest and most economically sketched I have ever seen.)

The level of excellence on all three channels is Master Class, and when they all come together they heterodyne. By that point I was exhausted, and I was only halfway through the book. From there, by God, she accelerated sharply and built to a climax! (Just like Goldman did, come to think.) I don't think "tour de force" is too strong; frankly, I'm stunned.

Oh, all right, it's not perfect. It could have been polished some; once or twice I got the feeling that a given chapter contained maybe one sentence worth of plot advancement and indeed was an entire chapter only because symmetry required a chapter of that Channel in that slot. The seams showed once or twice, is what I'm

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saying, only I'm being a little more unnecessarily redundant than is called for by strict necessity—which is *Up The Walls*'s other occasional problem. Then again, redundancy is an excellent way to minimize confusion with a complex plot. ("Don't worry about insulting my intelligence: give me good directions.")

So okay, toward the end I did maybe once or twice reflect that it certainly did go on. But then there was no law saying I *had* to read it in a single sitting.

The hell with picking critical nits. It's probably the best thing Tiptree has published so far, which more than means it's Hugo material. And I was impressed by the tastefully underplayed wit with which editor Hartwell made no mention of Tiptree's sex in the blurb copy, avoiding all sex-specific pronouns—and then ran Alice Sheldon's picture big as life on the back cover.

A gem, just barely flawed enough to make it bearable.

Lester del Rey has already reviewed **In The Ocean Of Night** in these pages, freeing me from the necessity of dwelling on its flaws and obliging me to rebut.

Because, while some of Lester's criticisms were quite well-founded, I liked the book one hell of a lot, and expect to nominate it for a Hugo when the time comes. It has some of the finest characterization I have ever seen in a science fiction novel, the more astonishing when you consider that it is one of those books that was originally written over a period of 5 or 6 years as a series of novelettes. Atypically, it has been substantially rewritten so that no seams show; its parts are combined rather than simply welded together. The advantage is that you get genuine and profound character growth over a period of many years, both of his life and the author's. The result is a protagonist so real that I feel I've known him all my life. Furthermore, I *like* him.

All the characterization is first-rate; the dialogue is excellent; the writing itself is economical, vivid and quite literate. But what I think I liked most was that *Ocean* is one of the most successful attempts to infuse a work of sf with genuine spirituality. This is something rarely attempted and even more rarely achieved; I beat my palms bloody in applauding it and Benford.

The book is almost *too much* like real life; perhaps that's a fair statement of Lester's objection to it. It's one of those books that leaves some major questions unanswered—just like life does. This may or may not make you uncomfortable with it as a work of fiction. I can only say that it impresses the hell out of me, and is a formidable kickoff for Dial Press/James Wade and Dell Books' new international sf publishing imprint, Quantum (who, by the way, happen to have bought the Stardance novel I mentioned earlier. Full disclosure here). Benford mailed me a galley out of the blue, saying, "If you're going to review *one* of my books, let this be the one," and I'm very glad he did. He has a right to be proud.

Pogo Possum and Albert Alligator are eating corn on the cob. Suddenly Pogo cries, "Albert! You is run plumb off the cob an' chompin' on yo' own arm!" Albert regards him evenly, says,

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"Buttered it, didn't I?" and continues.

In like manner I have nearly chewed my way right off this cob, and I'm not *finished* yet. Please accept then a hasty series of what I am forced to call "minireviews" (since "capsule reviews" sounds like what pharmacists read), with the understanding that almost every one of the remaining books is too good to be treated thisaway, and is *being* treated thisaway only as a sorry alternative to ignoring it altogether. Solution unsatisfactory, Okay?

The Compleat Feghoot: if you are not already familiar with the adventures of Ferdinand Feghoot, time/space traveler extraordinaire, be advised that each is a one page sf story ending in what the late Tony Boucher called "a pun of singular terror and beauty." If you *are* hip, be advised that this book has the first 50 from *Through Time And Space With* . . . plus 36 new ones, *and* an abominably punful introduction (by a writer named Anderson) that no sane editor would have touched with a six-and-a-half-foot Poul. (He and the author of *Gateway* are doing a survey of election methods in Warsaw called Pohl & Poul's Poles' Polls Poll, had you heard?) If you *must* read aloud from this book, make out your will first. (Order from Mirage Press, PO Box 7687, Baltimore, MD 21207.)

Critical Mass: precisely what happens when two such charged particles as Pohl and Kornbluth came together. This is essentially the 1969 Ballantine collection *The Wonder Effect*, with 3 stories dropped, 4 added, a new intro and a new afterword. The worst of the stories is pretty good; the best ("The Meeting") won the '73 Hugo. I'd recommend it even to those who already own *Wonder Effect*.

Gordon R. Dickson's SF Best: there's little to be said about this book that I haven't already said in the introduction and individual story headnotes I wrote for it. The title is literally accurate, and that in itself is the highest praise I've got. Oh, yeah, it has a *complete* Dickson bibliography, illustrations that're quite good, and an excellent photo of Gordy inside the back cover.

The Art of Science Fiction: the best sf and fantasy art book I've seen all year; one of the best I've ever seen. Let the man who's won ten Hugos take you on a tour of both the body of his work and the inside of his head. Excellent repro, interesting copy, fun for all. (Order from The Donning Company/Publishers, 253 W. Bute St., Norfolk, VA 23510.)

The Time-Swept City: this patched-together novel is occasionally awkward, relentlessly grim, and contains shocking lapses in plausibility. Nonetheless it works, and in spots is just brilliant. Monteleone needs only a strong copyeditor to become a major novelist. Try it.

Well, that felt pretty good. Starship Earth has an intercom system (the news media), and I've always been surprised and disappointed by the odd design, which only allows it to transmit bad news. No wonder morale is so crummy on this starship.

I hope I've been some help. ■

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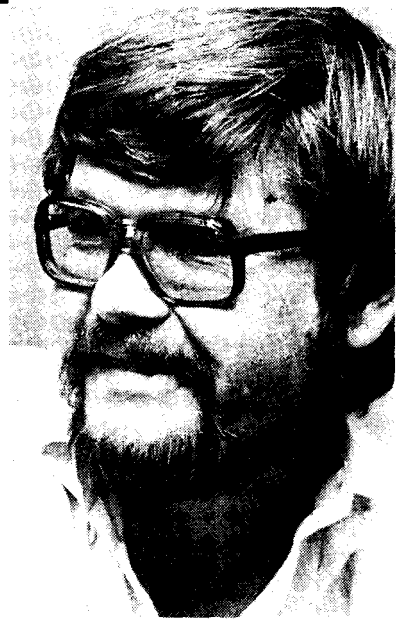
BIOLOG

by Jay Kay Klein



Greg Benford

One half of an identical twin pair, Gregory Benford has a full-time profession in theoretical plasma physics and high energy astrophysics. He received a PhD in theoretical physics in 1967 from the University of California, and is an associate professor of physics at that institution's Irvine campus. Strangely enough, his twin also has an advanced degree in science, but is deeply involved in practical applications of technology.

Greg was born into an American Army family the same year as the Pearl Harbor attack, resulting in his being raised in the South, Japan, and Europe. He started writing as a hobby in graduate school, with his first publication a science fiction magazine short story contest winner of one thousands words in 1965. Ten years later, his first Analog story appeared in the April issue. With a recently released novel, his third, In the Ocean of Night, Greg's hobby is beginning to bring in as much, or more, income as his full-time work.

This two-fold occupation results in a conflict between what he knows is possible in the light of present-day scientific knowledge and the requirements of a story. But Greg does not consider himself a "nuts-and-bolts" writer involved mainly with science, since he feels characterization and narrative ability are as important as the scientific background. On the other hand, Greg often looks at his colleagues' serious scientific speculations and thinks they appear more doubtful than much of what he reads in Analog.

Greg's scientific work has brought a Woodrow Wilson Fellowship and a Visiting Fellowship at Cambridge University. His astronomical research centers on the dynamics of pulsars, violent extragalactic events, and quasars. In addition to forty scientific papers, he has published numerous articles in such magazines as Smithsonian and New Scientist. In 1975, the Science Fiction Writers of America awarded him a Nebula for his collaboration on a novelette.

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Brass tacks

Dear Ben,

Just back from a year in Bangladesh, I was reading through the Analogs which had collected in my absence, when I noted the (Jan. '77) letter from Mrs. Ryberg (Brass Tacks).

Your answer was interesting, but you allowed to pass without comment a too-popular misconception, that the U.S. gives away food purely out of altruistic concern for the starving poor of overpopulated countries . . . and must continue to meet the ever-growing demands of those countries.

Ignoring for this moment the effects of such giveaways on the *recipients'* overall economy, which are negative in the long term view, consider what they mean to the U.S. economy.

For a start, we are one of the world's major food-producing countries, and that means the major *grain* producer. On the world market, demand for grain exceeds the ability of many 3rd/4th-world countries to pay. Our annual supply of grain has been in excess (lately) of what we can sell on that open market. Once private enterprise has exhausted its potential, short of "dumping," there remains a large volume of grain which was purchased by the government to ensure the U.S. internal market price did not fall below the farmer's costs of production. Unless the government is to pay staggering storage costs on this grain, and suffer the inevitable losses entailed, they have to dispose of the surplus.

Given the desire to dispose of the grain exists, how can we, as a people, maximize our returns while still "benefiting" others? We can try to burn, bury or plow the surplus under, but that has a questionable morality when people elsewhere are starving. It also carries a lot of attendant bad p.r. and is bad politics as well. Further thought shows we cannot sell at super-discount prices on the open market, as other grain-producing countries would (rightly) howl about our "dumping" ruining their chances to sell at a fair price. Still, there's nothing to say we can't *give* the grain away through our foreign aid programs! We can even (and do) stipulate that this "free" grain be transported on U.S. flag carriers . . . even if we pay for this ourselves, and include the value in the figure for total foreign aid granted to a given country.

What do we gain? Considering the political realities that virtually obligate us to assist developing countries, to say nothing of morality and economics, we are far ahead compared to just giving out dollars. Cash has a way of being spent almost anywhere, but aid-in-kind . . . even if later converted to cash by the recipient, is money that was spent within the internal economy of the donor country. In plainer American English, "giving away" grain means we spend more dollars in the U.S.A. for our foreign aid programs (money going to farmers, grain brokers, silo storage owners, truckers, railways and U.S. ships), and we both save money on indefinite storage charges and have a diplomatic carrot for possible use in luring "borderline" countries into more moderate and enlightened be-

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havior . . . according to our own viewpoint, to be sure.

Now, regarding the equally questionable morality of maintaining or contributing to further overpopulation, that is *another question.*

JOSEPH G. SHARP JR.

c/o 1108 Minneapolis
Sault Ste. Marie, MI 49783

Like most "altruistic" moves, there are strong pragmatic reasons behind our grain "giveaways." But are we benefiting ourselves in the long run by keeping other nations dependent on our crop surpluses?

Dear Mr. Bova:

To say that I am astonished and outraged barely scratches the surface of my feelings about "Legal Rights for Germs?", the story by Joe Patrouch which appeared in the November issue. This story is hardly SF. It is nothing but a low, cheap and vicious cut aimed at those of us in the Pro-life movement who are trying to make this world safe for all human life, born and unborn.

For years, antilife forces have been using every trick of semantics at their disposal to rob the unborn child of his humanity. They refer to a human fetus as "the aborted tissue" or "the product of conception;" they claim that the aborted baby is only a piece of meat, no more human than an appendix—all in complete disregard of the scientific facts. Now Mr. Patrouch is suggesting that the unborn child be placed on the same plane as a deadly disease germ. How much sicker can you get?

Anyone with any knowledge of fetology is aware that an unborn child is able to feel and respond to stimuli from at least the sixth week of pregnancy, and is even able to learn. But Mr. Patrouch, in his massive ignorance, compares this unique living being to a vegetable!

Before the 1973 Supreme Court decision, the rights of the unborn were clearly recognized by the courts. Even today these rights are occasionally upheld, as in a recent case in Illinois, in which a man has been indicted for murder in the shooting death of an unborn child. But generally the right to life of the unborn gets lost in the shuffle of expediency.

As I have always had great respect for Analog, I was very disappointed by this story. It seems that SF, despite its history of support for the underdog, has no aid to give to today's most helpless and oppressed minority group, our unborn children. But in "The Light that Never Was," Lloyd Biggle Jr. wrote some words that, although meant to apply to alien life, apply equally well to the unborn:

"Life is life's greatest gift. Guard the life of another . . . as you would your own, because it is your own. On life's scale of values, the smallest is no less precious . . . than the largest. Every life is a monument to all life."

It couldn't be said any better.

PATRICE SWADEY

5 Hillside Road
Claymont, DE 19703

Talk about semantically loaded arguments! And why do you assume Patrouch is "massively ignorant" merely because he appears to be opposed to your point of view? Extrapolation, exaggeration, and reductio ad adsurdum have long been valid tools of the science fiction practitioner. The "right to life" argument is a

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classic case of conflicts of rights—the mother's vs. the unborn fetus'—and there is room for strong opinions on both sides of the issue.

Dear Mr. Bova:

I could not help commenting on your excellent editorial of Jan '78. Being a member of the Federal bureaucracy myself, I cannot agree with you more.

It seems to me, however, that courage is far more difficult to display in routine daily situations than it can be in isolated, critical instances as in war. For many people, it may not be so much that they are cowardly themselves, but that they have never been given an occasion or opportunity to display whatever bravery they might possess.

Again, in describing the attitude of many others; if you believe in nothing, not even in yourself, it's hard to be courageous. For many then, courage has become simply endurance, a waiting out, a waiting for an end.

Before courage becomes possible, there must be a reason for it, a cause, something to believe in. It may be Humanity, or Literature, or Science, or Love. It may be Man in Space. Ultimately, it becomes a question of Religion . . .

Incidentally, might I also congratulate you on winning the Hugo once again for best professional editor. You have done a outstanding job with Analog over the years; possibly because you have taken so many chances with some of the material you have chosen to publish—another example of Courage.

WILLIAM O'CONNOR
6035 Broadway #3C
Bronx, NY 10471

There are many parts to courage. In the matter of "taking chances" on new writers and an occasional offbeat story, it's the readers of Analog who have shown the courage of their convictions: they are open-minded enough to read and decide for themselves, on the individual merits of each story, and then let the Editor know what they think.

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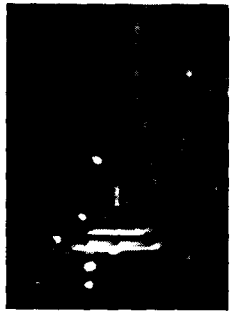

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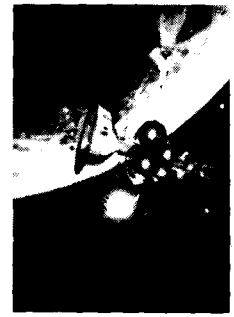

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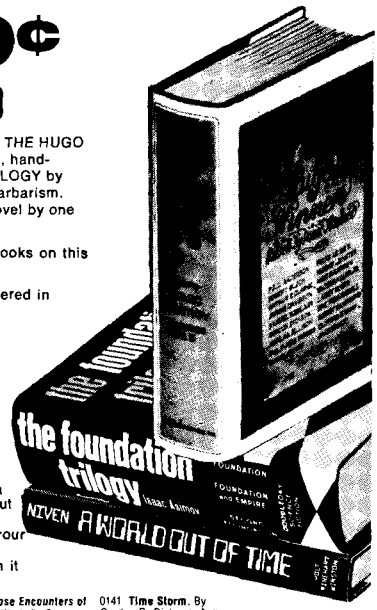

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